

The LEE WAY

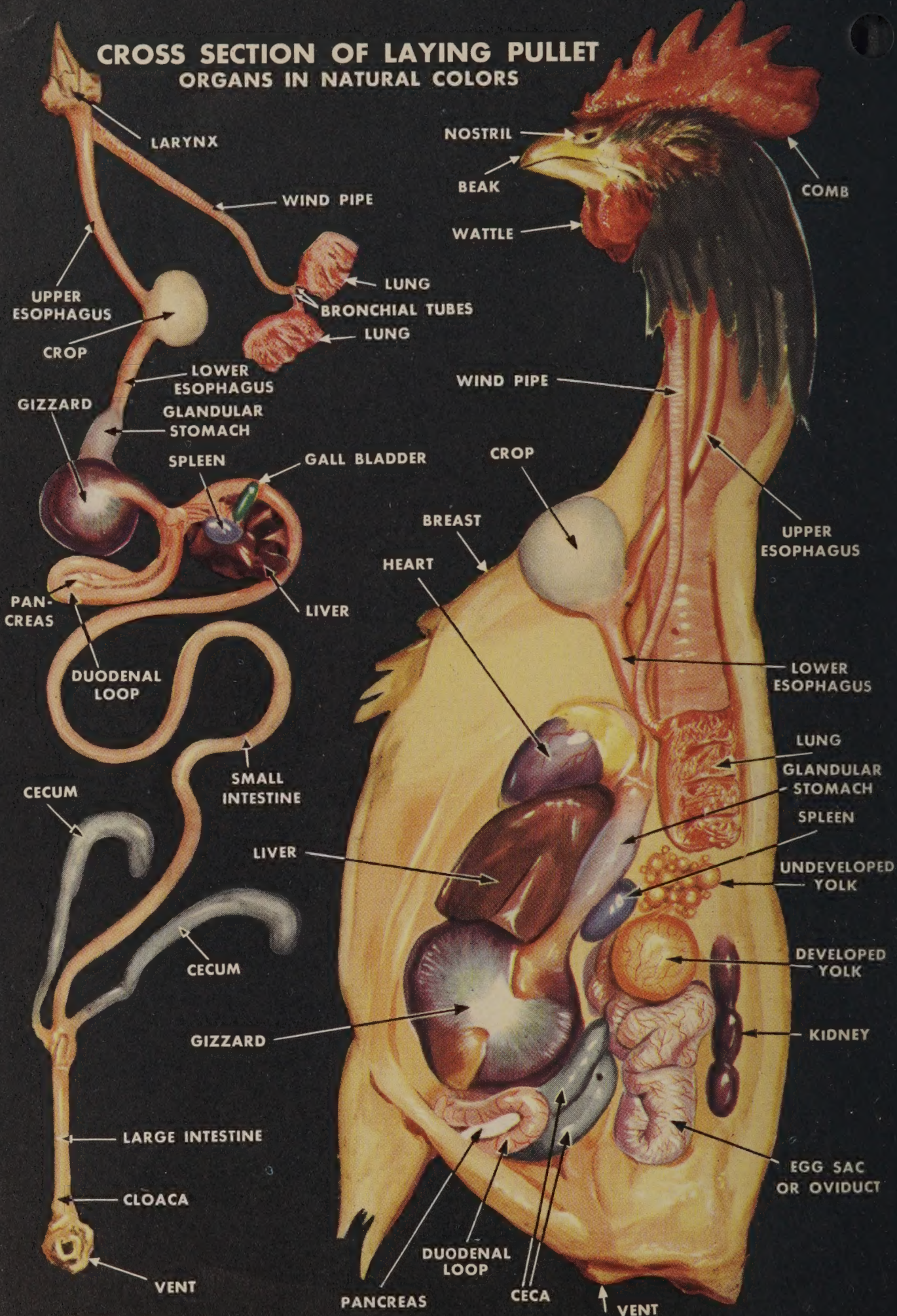
POULTRY BOOK



Meyerson

A PRACTICAL GUIDE TO POULTRY HEALTH

CROSS SECTION OF LAYING PULLET ORGANS IN NATURAL COLORS



ANATOMY OF THE PULLET (LEFT)

This picture shows clearly the appearance and arrangement of the internal organs of a healthy pullet. Aside from the egg sac and egg yolks the organs are exactly similar in chicks and male birds. The internal organs of a turkey are also the same except for larger size for the same age.

organ for disease is a knowledge of the normal, healthy organ. This is not hard to learn. The picture should be consulted a few times when dressing out birds you know are healthy. The only organ with a variable color in health is the liver. This will not be confusing because diseased livers are rather easy to detect.

The first step in examining an

COMMON DISEASES OF CHICKS UNDER 4 WEEKS OF AGE

DISEASE	MAIN SYMPTOMS	POSTMORTEM APPEARANCE
BRONCHITIS , Page 10 Caused by a Virus. Leemulsion, Page 70	<i>Gasping with beak pointed upward. Disease spreads rapidly.</i>	<i>Clear or turbid fluid found in windpipe.</i>
CANNIBALISM , Page 11 Pickpaste, Page 76	<i>Picking each other's toes, wings or vents. Bloody toes, wings or vent.</i>	<i>This is a habit not a disease.</i>
DIARRHEA , Page 12 (Simple) Cause—Non-specific Germozone, Page 54	<i>Diarrhea, pasting up about the vent. Small death loss.</i>	<i>Irritation of intestines.</i>
NEWCASTLE , Page 13 Cause—Specific Virus	<i>Gasping as in Bronchitis followed by nervous symptoms in a week or ten days. Newcastle is not common, but high death loss can occur when it is present.</i>	<i>Windpipe shows mucus. Cloudy or yellowish air sacs over the lungs and intestines. Can be positively diagnosed only by special laboratory methods.</i>
PULLORUM , Page 14 Cause—A Specific Germ. Germozone as a water disinfectant. Page 54	<i>Diarrhea usually but not always present. Chicks huddle together, seek heat, sleepy, chirp much of the time. Often pasted up about the vent. Most common disease of chicks under 3 weeks of age.</i>	<i>Small pin point spots on liver. Lung form show small yellowish-white spots in lungs. Laboratory required to make positive diagnosis.</i>
RIBOFLAVIN —deficiency (Nutritional)	<i>Birds go down on their hocks with toes pointed inward (curly toe). Appetite fairly good. Walk on hocks with aid of wings in extreme cases.</i>	<i>Nothing characteristic. Riboflavin deficiency is rare at present.</i>
VITAMIN A —deficiency (Nutritional)	<i>Chicks 3 to 4 weeks of age show stunted growth, ruffled feathers, weakness, lack of yellow pigment in shanks and beaks.</i>	<i>Cheesy like material is occasionally found under eyelids.</i>
VITAMIN D —deficiency (Nutritional) Rickets—Page 15	<i>Leg weakness, retarded growth, roughened feathers. Generally unthrifty. Beak may have rubbery feel.</i>	<i>Bones and back soft and rubber like.</i>

See General Index Page 4

COMMON DISEASES OF CHICKENS 4 TO 12 WEEKS OF AGE

DISEASE	MAIN SYMPTOMS	POSTMORTEM APPEARANCE
BOTULISM (Limberneck) Page 31 Caused by Bacterial Poison Germozone—Page 55	<i>Muscles of neck become paralyzed and head hangs limp. Usually follows eating decomposed meat.</i>	None.
BRONCHITIS —Page 10 Cause—Specific Virus Leemulsion—Page 68 Vapo-Spray—Page 69	<i>Gasping with beak pointed upward. Spreads rapidly. Very few deaths at this age.</i>	Clear or turbid fluid in windpipe.
CANNIBALISM —Page 11 Pickpaste—Page 76	<i>Picking each other. Bloody wings etc.</i>	A bad habit not a disease.
COCCIDIOSIS —Page 19 Cause—Microscopic parasites. Acidox—Page 66	<i>Wings and tail droop. Feathers ruffled. Diarrhea often bloody. This is the most common disease of this age group.</i>	Contents of Ceca or blind pouch of intestines bloody or cheesy plugs. Sometimes liquid with yellowish brown color.
COLDS —Pages 21, 36 Cause—Specific germs plus unfavorable conditions. Leemulsion, Page 68 Vapo-Spray, Page 69	<i>Watery discharge from nostrils and eyes. Birds sneeze and may show difficult breathing.</i>	Nothing characteristic.
PARALYSIS Leukosis, Page 40	<i>Bird goes down on side or breast with one or both legs paralyzed.</i>	The nerve going to paralyzed leg is usually enlarged.
PEROSIS , Page 23 Slipped Tendon (Nutritional)	<i>Bowed or badly twisted legs. Enlargement and flattening of hock joint.</i>	Deformity of leg bones.
TRICHOMONIASIS , Page 23 Cause—Microscopic parasites	<i>Resembles chronic Coccidiosis, loss of appetite, thin watery foamy droppings. Pale comb. Loss of weight. Not as common as Coccidiosis.</i>	Contents of Ceca foamy. Crop type—lining of crop covered with cheesy material.
VITAMIN DEFICIENCIES	<i>See Riboflavin, Vitamin A and Vitamin D under Chick Diseases.</i>	
WORMS , Pages 24–27 Gizzard Capsules, Page 60 Lee's Flock Wormer, Page 62	<i>Birds unthrifty, but have good appetite. Droopiness in severe cases.</i>	Parasites, usually large round worms, found free inside intestines.

COMMON DISEASES OF CHICKENS OVER 3 MONTHS OF AGE

DISEASE	MAIN SYMPTOMS	POSTMORTEM APPEARANCE
BOTULISM , Page 31 Cause: Poison produced by germs. Germozone, Page 56	<i>Limberneck—the muscles of neck become paralyzed and the head hangs limp. Usually follows eating decomposed meat.</i>	Nothing characteristic. Often maggots are found in the crop.
BRONCHITIS , Page 32 Cause—Specific Virus Leemulsion, Page 68 Vapo-Spray, Page 69	<i>Difficult breathing, gasping for air. Rattling sounds. Loss in egg production in laying flock. Very few deaths.</i>	Thick, but not bloody, mucus in windpipe.

Common Diseases of Chickens Over 3 Months of Age (Continued)

DISEASE	MAIN SYMPTOMS	POSTMORTEM APPEARANCE
CANNIBALISM , Page 34	<i>Birds picking each other.</i>	<i>A bad habit, often encouraged by prolapse in young layers.</i>
CHOLERA , Page 34 Cause—Specific Germs	<i>Comes on suddenly, often with heavy losses. Birds drop dead from roost or on nest</i>	<i>Small yellowish and red spots on liver. Red spots on heart. The inside of intestines inflamed.</i>
COLDS , Page 36 Cause—Specific germs plus unfavorable conditions. Leemulsion, Page 68 Vapo-Spray, Page 69	<i>Watery discharge from nostrils and sometimes eyes.</i>	<i>Nothing characteristic.</i>
LARYNGOTRACHITIS , Page 39 Cause—Specific Virus	<i>Gasping for breath, spreads rapidly, loss sometimes heavy, usually found in older birds. Causes rather heavy death loss.</i>	<i>Windpipe inflamed, lined with thick bloody mucus.</i>
LEUKOSIS COMPLEX , Page 40 Cause—Probably Specific Virus.	<i>Several types—Fowl, paralysis, big liver disease, grey eye and thick leg, pale combs. Lost appetite. May die within a week or 10 days after symptoms.</i>	<i>In paralysis—the nerves going to affected part are enlarged. Big liver disease—livers may be greatly enlarged or show spots varying from small whitish specks to large tumors, also tumors of other organs.</i>
POX , Page 43 Cause—Virus	<i>Grayish blisters turning to brownish black scabs on comb, wattles and face.</i>	
PULLET DISEASE , Page 45 (Blue Comb)	<i>Birds from 4 to 7 months of age, wilted or blue comb. Sunken eyes and shrivelled feet. Sudden onset.</i>	<i>Kidneys enlarged and light in color.</i>
PULLORUM , Page 45 Cause—Specific Germ	<i>This is primarily a chick disease. Hens act as carriers of infection and lay infected eggs.</i>	<i>The attached egg yolks are often diseased, a greenish or brownish color and deformed.</i>
ROUP , Page 46 Cause—Bacteria	<i>Foul smelling discharge from nostrils. Eyes swollen, may be gummed shut.</i>	
TUBERCULOSIS , Page 48 Cause—Specific germ	<i>Loses weight rapidly. Often lame in one or both legs. Appetite usually good to the last.</i>	<i>Cheesy, hard spots on liver. Sometimes on spleen and intestines.</i>
TYPHOID , Page 48 Cause—Specific germ	<i>Loss of appetite, dullness, increased thirst. Comb and wattles pale. Sometimes diarrhea. May die suddenly, much like Cholera.</i>	<i>Liver enlarged, greenish and soft. Easily broken. Linings of intestines pale.</i>
WORMS , Page 24–27 Gizzard Capsules, Page 60 Lee's Flock Wormer, Page 62	<i>Birds unthrifty but eat well.</i>	<i>Parasites found free in intestines.</i>

GENERAL INDEX

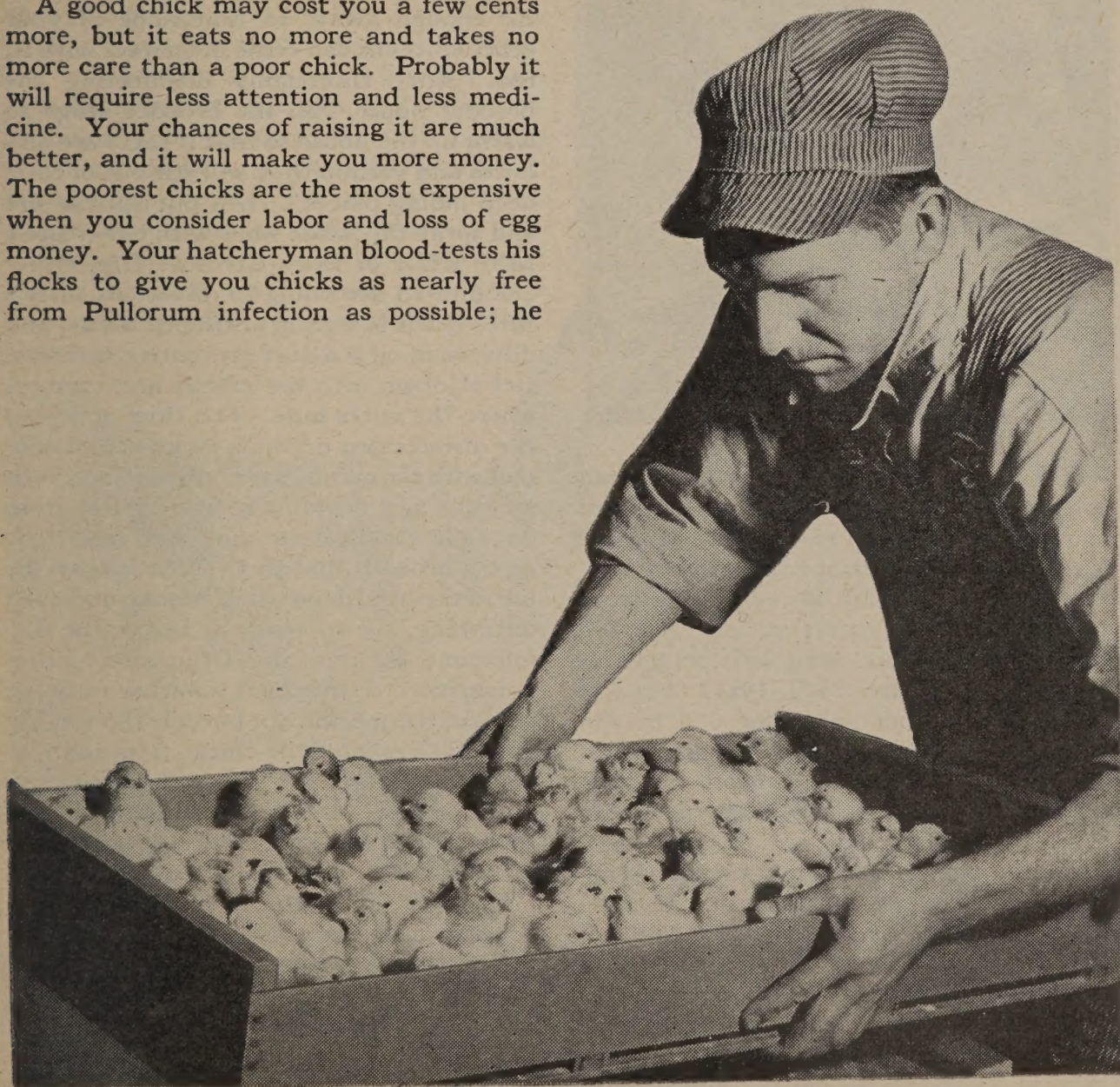
- | | | | |
|--|-----------|---|--------|
| Acidox | 66-67 | Head Lice | 12, 39 |
| Ataxia | 10 | Hog Oil Wormer, Lee's | 77 |
| Big Liver Disease | 41 | Lameness (See Paralysis) | 41 |
| Blindness (See Leukosis) | 42 | Laryngotracheitis | 43 |
| Blitspray | 74-75 | Laxatives | 40 |
| Blood Spots in Eggs | 31 | Leemulsion | 68, 70 |
| Blow Outs (See Cannibalism) | 34 | Leukosis Complex | 40-43 |
| Bluebugs | 39, 72 | Lice | 37-39 |
| Botulism | 31 | Light and Air | 9 |
| Bronchitis | 10, 32 | Limberneck (See Botulism) | 31 |
| Brooder Pneumonia | 11 | Litter | 6 |
| Brooding Temperature | 7 | Louse Powder, Lee's | 76 |
| Bumblefoot | 33 | Mite Killer, Lee's | 72-73 |
| Canker (See Pox) | 43 | Mites | 39 |
| Cannibalism | 11, 34 | Mycosis | 21 |
| Chick Diseases | 10-15 | Newcastle Disease | 13-14 |
| Chick Management | 5-9 | Paralysis | 41 |
| Cholera | 34 | Paratyphoid | 23 |
| Coccidiosis | 11, 19-21 | Perch Paint, Lee's | 71 |
| Colds | 21, 36 | Perosis | 23 |
| Chicken Pox | 43 | Pickpaste | 76 |
| Coryza (See Colds) | 36 | Pox | 43 |
| Creosote Dip | 79 | Price List | 80 |
| Diarrheas | 12 | Prolapse (See Cannibalism) | 34 |
| Dri-Rub, Lee's | 78 | Pullet Disease | 45 |
| Egg Eating | 36 | Pullorum | 14, 45 |
| Epsom Salts (See Laxatives) | 40 | Rickets | 15 |
| Eversion of Oviduct | 34 | Roup, Ocular | 46 |
| External Parasites | 37-39 | Scaly Leg | 47 |
| Feather Mites | 39 | Soft Shelled Eggs | 47 |
| Fleas | 39, 78 | Sticktight Fleas | 39 |
| Flock Wormer, Lee's | 62-63 | Temperature, Brooding | 7 |
| Fowl Pox | 43 | Tonax | 64-65 |
| Germozone | 53-58 | Trichomoniasis | 23 |
| Gizzard Capsules | 60-61 | Tuberculosis | 48 |
| Gizzard Erosion | 21 | Typhoid | 48 |
| Gray Eye | 42 | Vapo-Spray | 69 |
| Growing Birds, Diseases of | 19-28 | Worms | 24-27 |

Care of Chicks

BUYING CHICKS. This is much like buying a pair of shoes; you generally get about what you pay for. If you pay cheap prices, you usually get cheap chicks. The vitality of a chick and its capacity for laying eggs are bred into it. You cannot put those things into it even by good care and good feed; they must be inherited. Ask your hatcheryman about his best grades. He can help you get what is best for your individual needs. If your chicks are of sturdy, good-laying strain, then with good care and feed they should live and make you good profit.

A good chick may cost you a few cents more, but it eats no more and takes no more care than a poor chick. Probably it will require less attention and less medicine. Your chances of raising it are much better, and it will make you more money. The poorest chicks are the most expensive when you consider labor and loss of egg money. Your hatcheryman blood-tests his flocks to give you chicks as nearly free from Pullorum infection as possible; he

supervises the feeding and care of these flocks, he carefully culls them, sees that they are wormed, and are kept free from disease. He is doing everything possible to give you strong, livable chicks. You could, however, by just a little carelessness, undo in 24 hours, all that your hatcheryman has worked for a year to accomplish. Even good chicks require careful attention,—that is, clean, dry quarters, good food, and sufficient heat.



So the best advice we can give you is to buy the best chicks you can and give them good care. Find out quite definitely when you can get delivery so that you can make proper preparations to care for them before they arrive—not after. Then with good care and management you have a good chance for success.



DON'T OVERCROWD. Attempting to raise more chicks than there is room enough for, has been responsible for more losses than any other one thing in management. Overcrowding always spells trouble. About 35 square feet for each 100 chicks will be found very satisfactory. If your brooder house is say, 10x12 feet, you have enough floor space for 300 to 350 chicks. Instead of putting 500 chicks under one canopy hover, you will be more successful if you put from 300 to 350 under it.

Overcrowding has many faults. Some chicks may not get enough heat. There is a greater tendency for them to pile up. But the greatest danger lies in the fact that disease germs are more numerous in crowded quarters. Many losses can be traced directly to overcrowding. Now that there is a greater demand for poultry and

eggs too many people are trying to raise 500 chicks where they have room for only 300. Don't make this mistake. Better start 300 and be successful, than to buy 500 and lose 200 of them. If you can provide space so that the chicks can spread out you will have better success.

PREPARE IN TIME. Take steps early to insure comfort for your chicks and freedom from parasites. Several days before your chicks arrive, remove everything that you can, like fountains and feed hoppers, to the outside. Then sweep down the dirt and cobwebs from walls and ceilings. Then clean out every bit of old litter and sweep the floors. It's better to take this material far enough away, so that none of your other chickens can come in contact with it, too. After thoroughly disinfecting the brooder house, run the brooder stove to warm up the house so that if there are any mites and vermin they will stir out of their deep hiding places. Then put out the fire and spray the inside walls with either Lee's Mite Killer or Lee's Creosote Dip, either one diluted according to directions. Lee's Mite Killer is high in antiseptic value, and dilution in oil is a dust preventive measure. Get it down into the cracks and crevices where the mites hide. The chief action of the disinfectant depends on its actual contact with the germs. Unless the surface, such as walls and floors, is relatively free from dirt, the disinfectant may not reach the germs beneath that dirt. That is why the use of the hoe, shovel, and broom, and even scrubbing, are so essential before the disinfectant is applied. Otherwise, either much more disinfectant solution must be used, or the job will not be done thoroughly enough to protect the chicks from remaining contamination. You will be well repaid for this work done in cleaning. Let the house air out for a day. Then start the stove and have it warm and dry when you put the litter on the floor. Replace the hoppers and fountains after first giving them a thorough cleaning and disinfecting.

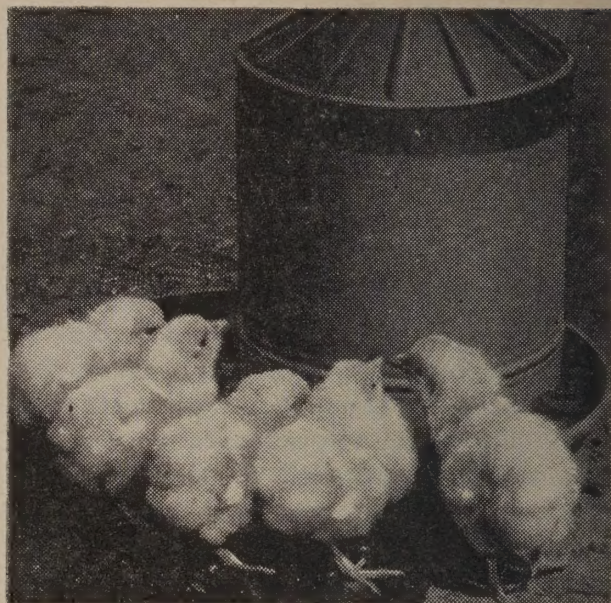
LITTER. Use a good absorbent litter on the floor at least three inches deep. Dryness, absorption properties, and freedom

from dust and mold are the essential qualities of good litter. Dry straw, hay, wood shavings, peat moss, cotton seed waste, cane waste, and ground corn cobs are good. Cheap litter has a decided advantage because it encourages frequent changing.

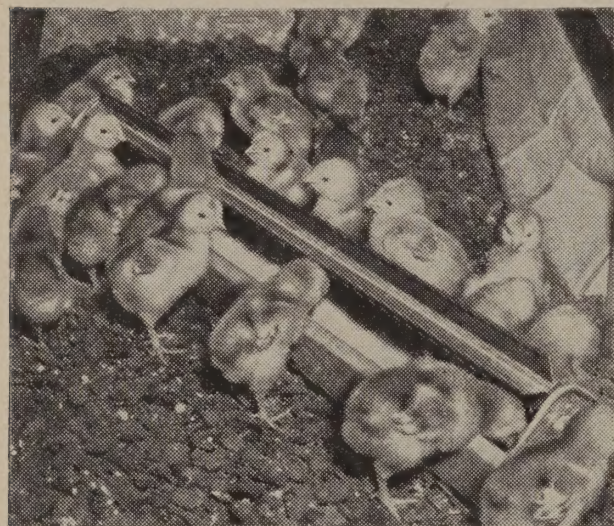
BROODING TEMPERATURE. Hang your thermometer on the edge of the hover, so that the bulb will be two inches from the floor. At first keep the temperature at 95°F. Drop the temperature very gradually, about 5° per week, for the first three weeks. After that, regulate the stove to suit the chicks; when they crowd, raise the temperature slightly and when they seem to try to escape from the heat, reduce it a little. When the chicks seem contented, the temperature is correct. Sudden outside temperature changes will influence brooding temperature. Therefore close watch should be kept when the weather is changeable. You can lose nearly as many chicks from improper temperature as you can from lack of feed, or water—especially during the first three weeks. So watch your temperature very carefully during that time.



FEED. A good Starting Mash is the safest food for the first six to eight weeks. The cost of this per chick is very small, so the best will be neither too good for your flock nor too expensive for your pocketbook. Milk can be given from the start, but not to take the place of all the water. Either skim-milk or sour milk can be used. After three weeks, both finely cracked grains and any available green stuff can be added to the ration. Growing Mash can replace Starting Mash at six to eight weeks. The



Give Germozone in their first drink.



Plenty of hopper space should be provided.

change should be made gradually by using a mixture of the two at first. Provide enough hoppers and drinking fountains. Figure on about one inch of hopper space per chick for the first five weeks, and then double that after the fifth week.

WATER. Water is very important. During cool or cold weather the chill should be taken off water for very young chicks; it should be about lukewarm. Use fresh, clean water, and do not fill the fountains until they have first been thoroughly washed out. After that they should be washed every day. It does not take long for clean water to become contaminated, because there will be particles of food and filth carried into the water on the chicks' beaks. Many disease germs get into the water in this way. Therefore, it is always worth while to add a little Germozone when the fountains are filled, one tea-

spoonful to the quart of water. (Regarding Germozone, see pages 53 and 54.) During the first week 100 baby chicks will drink approximately 4 quarts of water a day. When they are three weeks old they will drink about 2 gallons, and when they reach 12 weeks of age they will consume an average of 5 gallons a day.

CHICKS NEED TEACHING. Don't just dump chicks in the brooder house and expect them to know what it is all about. They need to be taught where to get their food and water, and where to get warm. Nature provided the mother hen, and the mother hen is a good teacher. But modern brooding practice has largely displaced her. Don't depend too much on instinct to guide your chicks to water, food and warmth. The sooner healthy eating habits are acquired, the sooner resistance will be built up. If a sufficient number of feeders and water fountains are furnished chicks will soon learn to eat and drink. One inch of feeder space per chick and one quart water fountain for each 25 chicks is sufficient. Chicks should also be shown where they can get warm. Push a few of them under the hover at first. The brooding area should be restricted at least for the first six or seven days. Wire netting, circled about three feet around the canopy is often used. Wire, however, does not

prevent floor drafts. One of the best methods is to buy some stove-pipe material from your hardware dealer or tinner. Circle this around the canopy of the brooder so that it is about three feet from the edge of the hover all around. Lap the ends over and fasten them together with a couple of clothes pins. If stove-pipe material cannot be obtained, the use of heavy cardboard, or of corrugated paper will serve the purpose very well. When the chicks are a week old, you can take down this screen, and let them have the run of the brooder house. By then you should also have gradually reduced the temperature to 90 degrees.

LIGHT AND FRESH AIR. Light is often an important consideration in poultry management. During the day chicks need enough light to form healthy eating and drinking habits. Difficulty seldom arises in colony brooding. For intensive battery systems, illumination must be sufficient for comfort but not enough to encourage Cannibalism. During the night, subdued light will allow rest and still prevent crowding.

Direct sunlight is the only practical light source of Vitamin D. It should be used as soon and as much as possible. Sunlight passing through glass has little value as a source of Vitamin D, but it is good for drying the litter and warming up the quarters. Glass substitutes have proved their worth for both chicks and laying flocks.

Fresh air is very necessary for baby chicks. But temperature has nothing to do with freshness. The air must not be cold and the chicks should be protected from drafts. Ventilation of the brooder must be adequate in all cases. Oil burners should be kept in good condition, with provision for carrying off the fumes. Many chicks die from the fumes of the brooder stove when other troubles are blamed.

Chicks should be placed on clean ground or wire floored sun porch as soon as weather will permit. Allow them outside about one hour each day for one week. After that time they should remain outside as much as possible. Such a practice allows them to gradually build up a resistance against

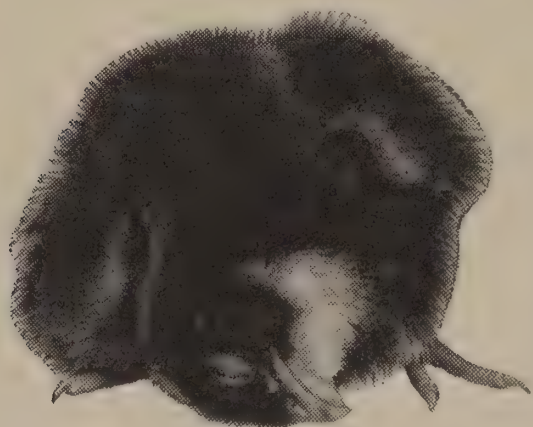
many infections not met with in the brooder house. Also this is the best way to give the young flock a maximum amount of fresh air without the danger of drafts.

CARE IS IMPORTANT. Of the millions of chicks that die every year, a large part of them die needlessly. Most of the helps that are so important for good success with your chicks, cost you no money—and very little effort. And others, such as a little Germozone in the drinking water or properly disinfecting the brooder room, will save you money when you consider the value of the birds and eggs you might have lost. Thousands who have raised poultry successfully, have found that it does pay to give the chicks those helps. Where Lee Products are advisable, they are recommended in this book. But it also recommends other common drugs where they can be used to advantage. Where a disease is incurable this book tells you so, and no Lee Remedy is recommended. This book will help you to avoid disease so as to make it unnecessary to treat sick birds. But it tells you how to treat your birds if disease does come. Lee Products are not recommended except where they are of real value.



Chick Diseases

ATAXIA. This is often called Crazy Chick Disease. It is not really a disease but is a condition due to failure of the little chick properly to handle certain elements of a feed that may be perfectly balanced and in every way good.



Chick with Ataxia.

Symptoms. The symptoms are always characteristic. The chick may jerk the head to its side or up over its back, or may twist its neck around until the lower beak is pointing upward as shown in the illustration. The chick may be standing normally, eating at the hopper, and suddenly throw its head over its back and start running backward, or in circles, and possibly fall over. Chicks under three weeks of age are more apt to be affected.

Treatment. No medicinal treatment is necessary. Ataxia has been known for many years as a symptom of individual nutritional trouble that caused practically no loss. At the present time this symptom is also associated with the nervous trouble of Newcastle Disease. See page 13.

BRONCHITIS. The term Bronchitis is commonly used by poultrymen and hatcherymen in referring to any condition in young chicks that causes gasping. Often they make no distinction between Colds, Simple Bronchitis, and Infectious Bronchitis, all of which produce that symptom.

The outward symptoms of all these dis-

eases resemble one another so closely that they cannot be told from one another except by a laboratory examination. This is true even of some Colds although a Cold often shows other symptoms which clearly indicate that it is a Cold. There is a great difference, however, between these diseases and the way they respond to treatment. Colds and Simple Bronchitis are the result of germs, while Infectious Bronchitis is caused by a specific virus (a disease producing agent that cannot be seen even with a microscope).

Colds seldom cause heavy losses in young chicks unless they are badly neglected. This is also generally true of Simple Bronchitis. Infectious Bronchitis, however, is more obstinate. It runs a rapid course, usually about 7 or 8 days, and the death loss may run high. Since Infectious Bronchitis is highly contagious, great care should be taken not to infect other chicks or older birds. A good precaution is to tend the well flocks first.



*Typical symptom of
Bronchitis*

Symptoms. The symptoms of all these, except Colds, are just about the same. The head and neck are stretched upward or forward and the chick gasps for breath. This gasping is noted with each stretching of the neck. If the chick is held to the ear a rasp-

ing, or bubbling sound is heard. Colds may show some gasping, but the gasps are not so frequent. In Colds a slight watery discharge from the nostrils may be noticed. The eyelids sometimes become glued together, and usually there is a Diarrhea.

Treatment. An increase in temperature is advisable, especially in chicks under three weeks of age. About five degrees is desirable. Use Leemulsion in the mash for chicks under six weeks of age. Directions will be found on the label. Germozone can be used in the drinking water at the same time to help prevent the spread of harmful bacteria. See page 70 for more detailed information regarding the use of Leemulsion.

BROODER PNEUMONIA. This is a broad term and it includes several diseases affecting the lungs of young chicks during the brooding stages. Pneumonia in chicks is often caused by Pullorum infection, sometimes by molds, and sometimes by other germs. The symptoms of Pneumonia may vary. One thing invariably to be noticed is that the affected chick will seek heat and chirps much of the time. It is relatively quiet and one can see at a glance that it is sick. Some cases show severe Diarrheas. Others show signs of Colds.

For all practical purposes we can assume that the Pneumonia producing organisms are always present. All they require to produce Pneumonia is a lowered resistance. And lowered resistance is likely to result from chilling or drafts.

Treatment. The first thing to do in all such cases is to stop any floor drafts and increase the temperature. If the chicks are under two weeks of age raise the temperature to 90 degrees. See that the litter is clean and free from any dampness.

Kill all sick chicks and add Germozone to the drinking water to aid in preventing the spread of the disease. Germozone in the drinking water is also of value for those that show bowel trouble. Feed lightly for a few days.

CANNIBALISM. This is a habit, not a disease. Out of curiosity chicks often pick one another's toes, wings, tail or vent. They may cause slight wounds; because

they like the taste of blood they get the habit and it quickly grows so that within a short time most of the flock will be picking one another.

Treatment. In earlier stages, before the habit has become too fixed, Pickpaste may be used to good advantage. Apply it on the backs or wings of about one-fourth of the birds so that those that pick will get a taste of the blood colored paste which they mistake for blood. The taste is repulsive to birds and usually will soon break them of the habit. Supply sufficient hopper space so that all can feed at the same time without being overcrowded. The treatment should be started at the first sign of picking because, like any habit, the longer indulged in the more difficult it is to be overcome.

There is evidence that lack of fiber in the diet may promote Cannibalism. Oats form a readily obtainable supplement to supply fiber. Whole, crimped, or clipped oats can be fed up to 25% of the total ration. For chicks under five weeks of age, ground whole oats can be used.

A litter that is fibrous is also helpful. This can be either peat moss or any kind of good straw, wood shavings, cane, or ground corn cobs. Overcrowding encourages Cannibalism, and makes it harder to stop. Each chick eight weeks of age should have at least one square foot of house space and twice this area of range.

COCCIDIOSIS. Only a few cases of this disease in chicks under three weeks of age have been reported. Coccidiosis is so rare below that age that it need not be expected. Good sanitation is usually practiced for the first two or three weeks, and then it takes from 4 to 7 days after the chick picks up the parasite, before it comes down with the disease. That is the principal reason why Coccidiosis seldom occurs in chicks under three weeks of age.

Often a postmortem examination on a baby chick will show "cheesy plugs" in the ceca, or blind pouches at the lower end of the intestines. Often they are found in chicks only 4 or 5 days of age. These plugs are sometimes taken for evidence of Coccidiosis.

They are caused by any bacterial infection such as Pullorum, Fowl Typhoid, Paratyphoid or by anything that irritates the ceca thus causing an inflammation and the formation of these cecal plugs. When chicks are overheated or chilled the natural resistance of the chick is lowered and the normal germs of the ceca may cause an inflammation resulting in cecal plugs. A number of different kinds of infection, as well as chilling or overheating, may have something to do with the formation of such "plugs."

The danger of Coccidiosis is greatest between the ages of 5 and 10 weeks. Then it appears as an acute infection. That is the time when greatest care should be taken to guard against this disease. Complete information on this subject will be found on pages 19-21.

COLDS. See Bronchitis, page 10, and Brooder Pneumonia, page 11.

DIARRHEAS. One of the most common troubles in chicks is Simple Diarrheas. They can generally be prevented by reasonable precautions, and they usually respond well to right treatment. They are not of infectious origin; that is they are not caused by some specific organism. For the common infectious Diarrheas see: Coccidiosis, Pullorum, Cholera and Typhoid. The simple Diarrheas are often caused by chilling, overheating, moldy or musty feed, improper feeding, or by drafts. In Simple Diarrheas the intestines are irritated and these local irritations furnish breeding places for different kinds of bacteria, many of which produce dangerous toxins or poisons. In that way, too, and by wearing down the natural resistance of the chicks, Simple Diarrheas often pave the way for more serious diseases.

Prevention. Germozone is excellent. Besides being a soothing and effective astringent, it helps to hold them in check. Germozone should be given to baby chicks in their first drink (one teaspoonful to the quart of water) and continued in that proportion until they are three weeks old. After that, and as long as the chicks are well, you may use Germozone only in the

water that is used to fill the fountains in the morning.

GIZZARD EROSION. Few poultry raisers will ever notice any loss from Gizzard Erosion. As a bad nutritional trouble it is limited to intensive broiler raising and the use of high protein forcing diets.

Cause. The gizzard requires an Anti-gizzard-erosion Factor to do its work without breaking down. This is a food element which is first derived from the egg. But the egg seldom furnishes enough of it, and about 85% of all chicks come from the egg with slightly pitted gizzard linings. Normally the deficiency is soon made up without serious losses. Under crowded conditions the chicks are less likely to overcome the deficiency.

Treatment. We do not have enough data on which to base advice on how to prevent Gizzard Erosion. The Anti-gizzard-erosion Factor is formed from bile, and the bile is formed from blood by the liver. Ground whole oats appear to be the most practical means for furnishing the required Anti-gizzard-erosion Factor. Therefore feed a mash containing 25% of ground whole oats until the condition has cleared up. Add 1% of Tonax to the mash. Tonax itself does not supply that factor and therefore is not a cure. But Tonax is of value in building up the resistance of the affected chicks until they can acquire a sufficient supply of the necessary Anti-gizzard-erosion Factor.

LARYNGOTRACHEITIS. See Bronchitis, page 10, Laryngotracheitis, page 39.

LICE. It is not difficult to protect chicks from contact with lice. The first step is preparation of the brooder house (See Prepare in Time page 6). Occasionally chicks are placed in a house recently vacated by older birds and not properly disinfected. This is very bad practice for many reasons, and it may account for some lice infestations in chicks.

Of the many kinds of lice on chickens, only the Head Louse seems adapted to living on chick down. Not until feather growth is well advanced do other lice seem

to thrive. Head Lice are acquired by contact with older birds, a factor almost entirely avoided in modern brooding practice.

Do not decide lice are present merely because chicks pick at themselves. If lice are actually found, treatment is necessary but must be given with caution. Chicks can be injured by insecticides that are entirely harmless to older birds. Lee's Louse Powder can be used on chicks over three weeks of age *by the pinch method only*. As much powder as can be pinched between the thumb and index finger can be sprinkled on the neck and back, and a like amount under the abdomen. One pound will treat 500 chicks. Use the powder on the chicks in the morning. If mother hens have to be dusted, do this in the morning and separate them from the chicks for three hours. Do not use Lee's Louse Powder or any other powder if chicks are wet or damp from any cause. (See Lice page 37).

MITES. Fortunately heavy mite infestation is rare with chicks. Mites are distinctly seasonal, thriving in hot weather when chicks are generally past the brooding stage. Thorough application of Lee's Mite Killer to the brooder house about a week before chicks are put in will kill any mites present and act as a disinfectant. No efficient mite killer can be used when chicks are already in the house.

MYCOSIS. See Mycosis page 21.

NEWCASTLE DISEASE. Newcastle

disease was not recognized in this country until 1940 although its existence in other parts of the world had been known for several years. Diagnosis has now been made in at least 40 states. First known by the popular name, "Respiratory—Nervous Disorder," the disease is found in chickens, turkeys, pheasants and pigeons. Newcastle disease infects chickens of all ages, but a high death rate occurs only among chicks of about four weeks of age or under. Egg production declines rapidly after infection, dropping to 10 or 20 per cent or even zero and remaining at that level for about six weeks. The disease in this country so far has been very mild when compared with reports from other countries where it has caused losses of from 80 to 100 percent and complete stoppage of egg production. In this country losses in the brooder have ranged from two to 40 percent.

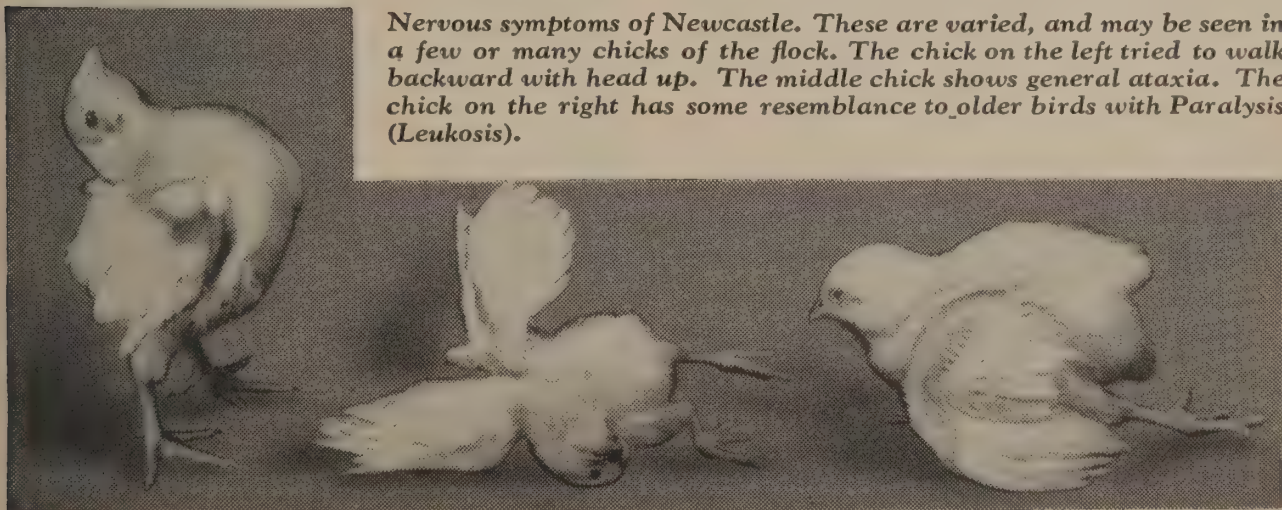
Cause and Diagnosis. Newcastle disease is caused by a virus (virus is the name given to organisms which cannot be seen with the aid of a microscope).

As is common with almost all infectious diseases Newcastle disease is probably spread by discharges from the nose and throat and by the droppings. The disease is not spread through hatching eggs.

Diagnosis of the disease in the field with any degree of certainty is impossible. If Newcastle disease is suspected, livestock sanitary officials should be contacted.

Symptoms. The two symptoms, respiratory trouble and nervous condition, may occur together or independently. Generally

Nervous symptoms of Newcastle. These are varied, and may be seen in a few or many chicks of the flock. The chick on the left tried to walk backward with head up. The middle chick shows general ataxia. The chick on the right has some resemblance to older birds with Paralysis (Leukosis).



the respiratory trouble appears first and is followed by nervous disorder within a week or ten days. The respiratory symptoms are difficult breathing and rattling sounds in the windpipe which are similar to those experienced in infectious bronchitis. The nervous symptoms are characterized by a twitching of the neck into abnormal positions, "crooked neck," and at times twitching of the head. The wings may droop as they often do in fowl paralysis. Chicks having the disease show a whitish diarrhea which is absent in infectious bronchitis.

Treatment. There is no specific treatment for Newcastle disease. Experimental vaccine as a preventive holds some promise. When Newcastle disease is found in chicks they should be finished for broilers and the house very carefully cleaned and disinfected before another brood is purchased.

Laying flocks should be kept in close quarantine, using very strict sanitary measures. The birds should be sold for slaughter at least six weeks before the pullets are brought in to re-populate. Extreme care must be taken in the proper cleaning and disinfection of the laying house.

Treat chicks the same as for chick Bronchitis. See page 10.

No Cause For Panic. This information about Newcastle is given to help and not to alarm the poultryman. We know Newcastle has been with us since 1940. It may have been around before that. In view of its rapid spread in a flock, why hasn't it caused more damage than it has? The answer may be in a high natural resistance most chicks have to the disease. In the past many virus diseases, Laryngo for example, have flared up and subsided to a less costly level. The Newcastle virus in this country is much less devastating than in Europe. That in itself makes room for hope rather than despair.

PARATYPHOID. See Paratyphoid, page 23.

PEROSIS. See Perosis, page 23. The detection of Perosis in chicks under four

weeks of age is rather difficult. Under average poultry farm conditions, the trouble seldom develops except with an extremely poor feeding program. Good commercial starting mashers have the minerals balanced to avoid Perosis.

PULLORUM. This is a highly infectious disease in young chicks between 1 day and 3 weeks of age. It is really a blood poisoning. The germ causing Pullorum belongs to a family composed of a large group of germs, some of which may cause the same symptoms. Pullorum can therefore be diagnosed with accuracy only by a laboratory examination.

Symptoms. The external symptoms are much like those of a number of other diseases. The chicks will huddle together, and generally seek heat under the brooder. They have a drowsy, sleepy appearance and chirp much of the time. Usually there is no Diarrhea. When there is, it is of a whitish, or brownish appearance. It has a tendency to cling on the fluff about the vent, and within a short time a plug of this accumulated material may completely cover the vent. That is, the chicks may become "pasted up." In cases where the lungs are affected, breathing becomes rapid, and the chick has a "balled" appearance.

Postmortem. The liver is usually a light yellowish, or ochre color. An unabsorbed egg yolk is generally found. When the lungs are affected, small yellowish or whitish spots about the size of a millet seed will be found on the surface of the lung which lies next to the ribs. The heart may show small bumps or small swollen spots on its surface. These bumps have a grayish appearance.

Treatment. Pullorum is incurable. However early care can do much to build up the natural resistance of the chicks to a point where they are less likely to die of the infection. They will not make good layers, and it is advisable not to carry them beyond the broiler age. Cleanliness is one of the most important things. This should include frequent disinfection of drinking fountains, hoppers, and floors. The litter should be changed often because an af-

fectured chick will pass millions of Pullorum germs in its droppings. Sufficient heat is also necessary, even a few degrees higher than what would be normal for chicks at that age, but never more than 95 degrees.

Often by good care and management severe losses from Pullorum may be avoided. Germozone is recommended in the drinking water to help prevent the spread of infection. The destruction of sick birds is advisable when the disease is known to be present to protect the rest of the flock. See Pullorum, Page 45.

RICKETS. This is a condition in which there is a defective formation of bones. It is found in all kinds of warm blooded animals. In chickens, the thigh bone is a good one for examination when the disease is suspected. In six-week birds an attack of Rickets may appear very much like an outbreak of Coccidiosis. The older the chicks, the more weight the leg bones must bear. This makes diagnosis easier because lameness is noticeable. On postmortem, if the upper end of the thigh bone is pulled from the socket, the end is likely to be found to be spongy and can often be crushed easily between the fingers. The lower ends of the ribs are easily bent, and the beak has a rubbery feeling and bends easily.

Causes. For the body to make use of calcium in the formation of bones, a suffi-

cient amount of Vitamin D is essential. Lack of Vitamin D is the commonest cause of Rickets. Since birds exposed to sunlight three to four hours each day can manufacture sufficient Vitamin D, Rickets will rarely occur in such flocks unless there is a lack of calcium.

Treatment. There should be in the mash 2% of a mineral containing calcium. Two pounds of limestone, gypsum, or crushed oyster shell to every hundred pounds of mash will supply sufficient calcium. Commercial mashes always contain a sufficient amount of this essential mineral.

Extra Vitamin D can be supplied by adding Poultry Cod Liver Oil to the mash. It is better mixed fresh every two or three weeks. Add 1 pint of the oil to 10 pounds of mash and mix thoroughly by hand. Then mix that by shovel with 90 pounds of mash. This gives a 1% mixture and is sufficient where the mash already contains cod liver oil. For mashes made at home, 2% cod liver oil (2 pints to each 100 pounds of mash) can be used if necessary.

A reliable feed dealer should be consulted for any nutritional troubles and on any question about feeding.

WORMS. Worms are generally not common enough in young chicks under six weeks of age to cause much concern.

The greatest danger comes after the chicks are turned outdoors. From then on, and during the entire life of the birds, worms are a menace. Round Worms are usually first to develop because there are few farms that do not have large numbers of round worm eggs on the ground or in the buildings. So as soon as the chicks are turned outside there is a strong probability that they will pick up some of these worm eggs.

Round Worms are not so difficult to control if measures are started early. Once young birds have been allowed to become filled with Round Worms, it requires a heavy dose of medicine to remove them. Young birds that have even occasional contact with older birds often show heavy worm infestation. The same is true for chicks ranging on ground recently occupied by an older flock.



Chick affected with Rickets.

Care of Growing Birds

The most critical time of a bird's life is between the fourth week and the fourth month. That is the developing, or growing period. A good chick can be ruined as a profitable pullet during this time by neglect. Many people take the best of care of their chicks until they reach the age of four or five weeks, and then let them rustle for themselves until September.

True, the young flock has now passed the "chick danger zone." However, they will have to meet dangers much more costly than those met during the chick stage. The loss of a few chicks under three weeks of age is only the loss of the small cost of the chicks plus a negligible amount of feed and labor, but to lose birds two, three, or four months of age is a much greater loss. But this is the time when we generally get lax, due to the press of other work, and sanitation is either forgotten or practiced only carelessly. Later, when losses begin to occur as the result of Coccidiosis, Paralysis, Colds, Typhoid, or worms, we just can't understand it; we never had a flock that did better, and here, all at once, they start to die and it

looks as if we might probably lose all of them.

The truth is, all of these troubles can be traced directly to neglect, with the exception of Paralysis. We have let the flock range on ground that contains worm eggs or coccidia, or we have let them roost in a damp or drafty building, or we have let them run with the old flock. We should always bear in mind that sanitation means seeing that the birds have fit and favorable conditions to live under, and keeping the premises as free from germs, worm eggs, and other infections as we can.

Overcrowding is one condition that is very common and very costly. Usually the poultry raiser has taken care to provide enough room for the young chicks. But chicks grow, and when they become twice as big they need three times as much room. Too often they have no more room than they had when they were baby chicks.

Overcrowding is likely to bring on Colds. And it makes just about all communicable diseases more likely because the young birds are in close contact with one another, and because overcrowding reduces



resistance and greatly increases the concentration of filth and disease germs.

There is a big difference in resistance between chickens, just as in people. Some have a higher natural resistance against disease than others do. For instance, in an outbreak of Colds some become quite badly affected, yet others show no signs of it. The same is true even in an outbreak of Cholera; some of the birds die, others may become quite sick for a few days but recover, while still others will go through the attack without showing the least sign of infection.

We can do much to help our flock avoid disease. Two things must be done for this. One is to keep disease germs down below the disease level. The other thing is to build up the resistance of the birds so that they can successfully combat such disease germs as do attack them. Remember, two things that do much toward tearing down resistance are intestinal worms and intestinal irritations. But Lice and Mites, overcrowding, and poor housing conditions also lower resistance. To help avoid intestinal irritations, Germozone is advisable. The regular use of Germozone once a day in the drinking water, and the addition of 1% of Tonax to the mash, will be found to be a good program to follow throughout the growing period. (See pages 55 and 64.)

Thousands of poultrymen use Germozone regularly for the first few weeks and know its value. But as soon as the chicks are put out of doors some of them take no further precautions. This is unfortunate. Germozone is just as valuable for growing stock and for old flocks as it is for young chicks. Germozone should be used regularly as a part of the sanitary program—for chicks, growing stock, and adult birds.

However, medicines cannot take the place of good sanitation, good management, and good feed. They cannot perform miracles, but they can, and do help nature to help herself. No sanitary program has ever been worked out to keep chicks or older birds from picking up some germs. If relatively few germs are taken in daily, the bird's system can usually overcome them satisfactorily. But if more germs are picked up than nature normally

can take care of, the bird becomes sick.

The practice of cleanliness is therefore of utmost importance. However, in spite of all you can do to keep the premises clean, chickens will often get the drinking water quite badly polluted within a short time. They do this by carrying filth particles on their beaks which are washed off in the drinking water. But if the floors and runs are allowed to become filthy, the birds are likely to pick up more germs than both nature and Germozone together can handle. That is why we say that medicines cannot do away with the necessity for cleanliness.

The problem of culling should not be disregarded during the growing period. At the age of eight to ten weeks, two or three chicks out of each hundred will often show lack of normal growth. These runts may be less than half the size and weight of normal birds. At three months they will have passed a peak of growth capacity that will never return. Such birds will never show a profit, and the sensible thing is to get rid of them. They waste feed, often take up space needed by the others, and are in general a nuisance to the poultry raiser.

While raising straight run chicks presents no great difficulty in management in normal times, under present conditions of feed scarcity it is important to adjust the program of rearing to get the most out of cockerels for the least feed. It is always well to separate the roosters from the pullets as soon as sex can be determined. This is generally easy in the case of Leghorns, and more difficult for heavy breeds.

Accurate separation is seldom required. The object is to protect the smaller birds from the ones that develop strength and size more rapidly. Hence it is sufficient to take out the cockerels from time to time when they can be distinguished as such. By the end of the third month, all of them will be separated so that they can be finished for market.

It has been a common practice to allow pullets to develop normally. Access to ample range, green if possible, with no forcing diet, has proved helpful in building sturdy pullets. Other methods may get



the flock into the lay somewhat earlier, but the birds seem less able to stand the strain of continued high production.

With cockerels, the situation is quite different. Too many males are fed between the ages of four and six months at an actual loss to the poultryman during that period. It is a good rule to get Leghorn males on the market at three months of age, and heavier breed cockerels at four months of age. This means the use of limited range, with a diet formulated to aid rapid growth. In other words, the average poultryman can get more out of his male birds if he uses some of the tactics found

valuable by the experienced broiler raiser.

There are exceptions of course to the above procedure. Breeders will handle male birds with the same purposeful care as their pullets. Some poultrymen like to raise a few capons, and a limited group have found larger scale capon raising profitable. In general, keeping cockerels for roasters at six to eight months of age is unprofitable, especially when ample culls from the pullet flock will be available at that age.

The following table of feed and water requirements will be found useful in flock planning.

APPROXIMATE FEED AND WATER CONSUMPTION OF EACH 100 CHICKS

Age in weeks	Feed per 100 chicks per week		Daily Water Consumption
	LIGHT BREEDS	HEAVY BREEDS	
1.....	8 lbs.....	8 lbs.....	4 qts.
2.....	17 lbs.....	18 lbs.....	2 gal.
3.....	24 lbs.....	25 lbs.....	2 gal.
4.....	38 lbs.....	42 lbs.....	2 gal.
6.....	53 lbs.....	60 lbs.....	3 gal.
8.....	76 lbs.....	85 lbs.....	3 gal.
10.....	92 lbs.....	103 lbs.....	4 gal.
12.....	98 lbs.....	105 lbs.....	5 gal.

Diseases of Growing Birds

CANNIBALISM. See Cannibalism, pages 11 and 34.

COCCIDIOSIS. This is one of the most common and most serious of chicken diseases. At one time it was believed that Coccidiosis affected only young birds between three and ten weeks of age, but now

especially near the buildings or in them.

The parasites that cause Coccidiosis are called coccidia. They are too small to be seen without a microscope and they are extremely hard to kill. They can live in the ground from one year to another if there is a little moisture. Moisture is necessary for them, and that is why Coccidi-



A typical advanced case of Coccidiosis.

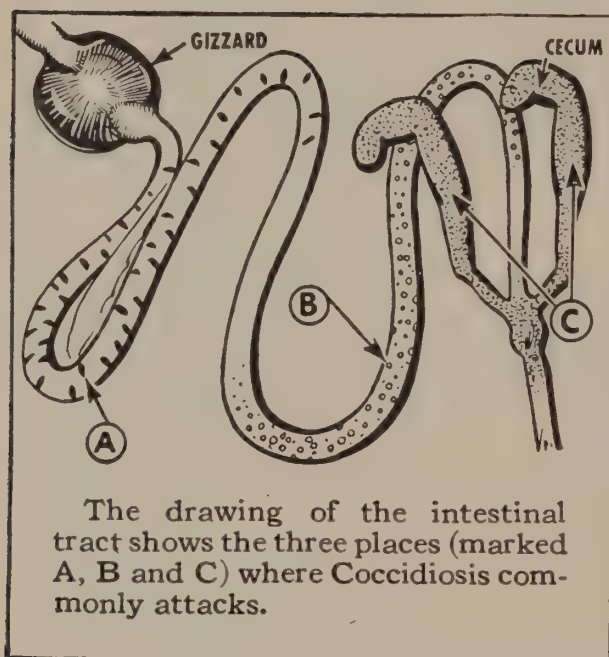
it is probably just as common in laying pullets and it frequently occurs in adult birds. Many fowls that show little or no signs of the disease, pass out large numbers of the parasites that cause Coccidiosis, in their droppings. There are few farms or poultry yards in the Nation which do not have some of these parasites in the soil,

osis is more common in wet years.

There are several different kinds of coccidia. Some kinds attack the lining of the intestines while other kinds do their damage in the ceca, or blind pouches at the lower end of the intestines. But for practical purposes, we can divide Coccidiosis into two kinds, an intestinal form and a

cecal form sometimes called "Bloody Coccidiosis."

Symptoms. The cecal kind makes its appearance quite suddenly, sometimes almost overnight. It affects young birds between 3 and 10 weeks of age. Generally the first ones to die are not the weakest or smallest birds as might be supposed, but the largest and best ones. It kills quickly, and frequently a large proportion of the young birds are lost during the first few days. Of course within a short time nearly all of the flock will be affected, unless very prompt and effective steps are taken. There is a sleepy appearance, the wings



hang, the birds seem not to want to move about, and they seek warmth. Frequently, but not always, there is blood in the droppings.

Pullets and older birds usually get only the intestinal form of Coccidiosis. It is sometimes called "Chronic Coccidiosis." Here we see a different picture. No large numbers of birds die within a few days but some of the pullets begin to develop a mild Diarrhea, they don't care to move about very much, and their appetite gets poor. After a few days they begin to lose weight and, unless prompt measures are taken, a considerable number of them will die.

Postmortem. If Coccidiosis is suspected, it is always advisable to open and examine any bird that dies. In the younger chicks

of 5 to 10 weeks of age, first examine the ceca, or blind pouches at the lower end of the intestines. If it is the cecal form you will find one or both of these ceca enlarged, and usually filled with blood, or a hard, cheesy plug. If this is not found, carefully examine the entire intestines for a thickened condition of the intestinal wall, or for red or white spots on the lining.

In pullets the ceca are rarely affected, but when their intestines are split open considerable mucus is generally found, and the wall of the intestines is swollen, or thickened. Sometimes red or white spots can be seen on the lining, or inside surface of the intestines, and the white spots may even be seen through the intestines before they are opened.

Prevention. It is better to do all you can to prevent any severe outbreak of Coccidiosis, than to have to fight the disease. A number of things should always be done. First, see that the brooder house is properly cleaned and disinfected, and that the floors have a good amount of litter on them. Do this before the chicks come. Sand does not make a good litter; use one which will take up the moisture. Wheat straw is good but needs to be changed more frequently than some others such as peat moss, sugar cane by-products, ground corn-cobs, and several others on the market. The main thing is to keep the litter as dry as possible. A deep litter, stirred often with a fork, is important and can generally be used until the chicks are large enough to go outdoors. Second, be sure the chicks are not overcrowded, and that there are enough feed hoppers and fountains. Change these to different places each day, to avoid wet spots. Third, do not try to brood chicks of different ages together; nine times out of ten it doesn't work.

Acidox as a Preventive. Many poultry raisers find that Cecal Coccidiosis appears at a fairly definite time every year. Acidox at the rate of one tablespoonful per gallon of drinking water (or not more than four teaspoonfuls) has a definite killing action on the organisms causing this trouble. Hence a ten day treatment started shortly before danger periods is often advisable.

A week should pass between each ten day treatment period. The organic arsenical used in Acidox is harmless when directions are followed. As a matter of fact it has a tonic effect at a dosage of one teaspoonful ($\frac{1}{4}$ ounce) per gallon. The little extra care necessary in use is a small price to pay for the greatly increased efficiency of Acidox.

There is one thing, however, in your favor. Chicks can build up an immunity against Coccidiosis, provided they do not pick up the coccidia in too large numbers. If you had the disease in your flock last year, you can assume that plenty of live coccidia still remain on the premises. It is a good plan to allow all chicks, when they are two or three weeks of age, and if the weather permits, to get out on the ground, but only for one hour a day for the first week. After that, the time outdoors should be gradually lengthened. That allows the chicks to pick up a few coccidia each day, but usually not enough to cause the disease. They therefore gradually vaccinate themselves. It is only where chicks are allowed to pick up coccidia in great numbers that Coccidiosis develops. That is



Rough Feathers—a common external sign of Cecal Coccidiosis.

why the first birds to die of Coccidiosis are often the largest and best ones. They were the most active birds and they picked up more coccidia than the less active ones.

What to do for symptoms. If sanitation

has been good throughout the brooding period, the external symptoms may be limited to pale combs and sleepiness in some birds of the flock at nine or ten weeks of age. Whether the outbreak is mild or severe, you can do a lot to keep down losses. Sanitation should be intensified if necessary, but the chief problem is to keep the birds eating and drinking so that they can restore damaged tissue.

Acidox in Treatment. Start medication at the first sign of trouble. The cecal form of Coccidiosis is generally a major factor in any outbreak of the disease in birds under three months of age. The minimum effective dosage is one tablespoonful per gallon. This should be increased slightly the second day, but not beyond four teaspoonfuls per gallon. You can use Acidox as a valuable aid for both prevention and treatment at very small cost.

COLDS. Often colds in growing birds are both troublesome and costly. Sometimes they occur during the hottest months of the Summer. Hot days and cool nights, especially when the temperature changes suddenly, are likely to cause a Cold. Drafty houses, overcrowding, and wet, rainy weather also are likely to bring on Colds. However, even under conditions that seem to be ideal, sometimes Colds are quite a problem during the growing period. Those cases often result from a rundown condition of the birds, and the rundown condition often is the result of worms, lice, mites, or Coccidiosis.

Any evidence of Colds should always be regarded as serious and prompt treatment should be started. Try to locate the cause, and correct it. Unless such Colds are relieved, they are likely to result in Roup. Colds often cause not only considerable death loss, but also stunted birds.

For more complete information on Colds, and for their treatment see page 36.

MYCOSIS. This is a very broad term embracing all diseases caused by fungi (which include the molds). From a practical standpoint such troubles are not common in chickens, and seldom cause loss under conditions of good management.

Where filth prevails, not only parasites but normally harmless scavenger micro-organisms tend to multiply. To this latter class belong most of the fungi. We can logically expect to find a larger amount of mold growth in the crops of birds in these cases than in well cared for flocks.

The only trouble from molds occurring in chicks is Aspergillosis (mycosis of the lungs). The disease is extremely rare under modern brooding conditions. Pneumonia characterized by visible grey spots on the lungs of chicks is nearly always bacterial infection (Pullorum or Paratyphoid). When it is known to be present, weaklings in the flock should be killed on account of the highly contagious nature of the trouble.

The chief form of mycosis reported at times by poultry disease experts in older birds is Thrush (mycosis of the digestive tract). Grey or white patches can occur in the mouth and on the lining of the crop and glandular stomach. Loss of appetite, watery discharge from the mouth, and greenish diarrhea may be observed. Sometimes the glandular stomach (which lies between the crop and gizzard) shows considerable swelling, and possibly some ulcer-like spots on its lining. The gizzard is more often affected. In less severe cases there appear to be fissures, or craters in its lining membrane. In the more severe cases even ulcers in the lining will be observed. Some of these may extend clear through the lining and into the muscle. A section, and sometimes almost all of the lining may be loosened, and underneath this lining, there may be a grayish substance like that appearing in the crop. The intestines rarely are affected, and when they are it is only the part next to the gizzard. It may show a slightly swollen, or thickened condition. All necessary measures to correct faulty sanitation, including the use of a drinking water antiseptic such as Germozone, should be taken. Badly affected birds should be culled out.

Mycosis should not be diagnosed just because symptoms do not fit more common diseases. Weakness and loss of appetite in young birds also accompany chronic Coccidiosis, Trichomoniasis, and Round Worm infestation. As birds become ma-

ture, any digestive trouble with disturbed bile flow can result in a greenish diarrhea. Canker in the mouth may be the most common symptom noted in some outbreaks of Fowl Pox.

Treatment. Clean houses, clean litter, clean fountains, and clean feed should be given first consideration. In other words remove the cause of this mold just as well as you can. Around the hoppers, where the birds have billed out some of the feed, is a place where the molds are likely to form. Also around the fountains, because dampness helps molds to grow rapidly.

A diluted solution of Copper Sulphate is often recommended for Mycosis. Two ounces of this chemical (see your druggist) are dissolved in a quart of water and 1 tablespoonful of this solution added to each gallon of drinking water. This can be used in the same drinking water with Germozone. Any Copper Sulphate preparation may tend to corrode galvanized drinking vessels somewhat.

LARYNGOTRACHEITIS. See Bronchitis page 10, and Laryngotracheitis, page 43. Fortunately Laryngo is not a disease of chickens under three months of age. Bronchitis can occur, and it often passes from chicks to older birds. It is nearly always a mild disease after five weeks of age, even though the breathing may be very noisy for a few days.

LAMENESS. See LEUKOSIS page 40.

LICE. These parasites do not thrive on chickens or turkeys under three months of age. Probably the active young birds can pick them off faster than they can multiply. In rare cases an infestation may build up from contact with heavily infested older birds. Lee's Louse Powder should be used on growing birds when necessary. Perch Paint and Blitspray are not satisfactory at this age.

MITES. The common poultry mite attacks chickens of any age. Due to the fact that this parasite thrives only in hot weather, mite damage to growing birds is not very common. If the problem does

arise, Lee's Mite Killer (page 72) can be used. Litter treatment using Lee's Mite Killer will destroy mites except for those which find biding places above the floor level.

PARATYPHOID. This name is given to a disease condition which affects chickens, especially young chicks and growing birds; and also turkey poults, ducks, geese, and pigeons. It is caused by any of a group of germs in a large family of germs. To that same family also belongs the germ that causes Fowl Typhoid and the one that causes Pullorum Disease.

Symptoms. At times Paratyphoid causes considerable losses in baby chicks and older birds. In young chicks the symptoms and postmortem findings are the same as those of Pullorum Disease. (See Pullorum Disease, page 14). When this disease occurs in older birds there is a general unthriftiness, the appetite is poor, and a diarrhea develops. On postmortem the intestines are found to be inflamed and to contain a thick mucus.

Treatment. There is no satisfactory treatment for Paratyphoid in young chicks. The same care and management as for Pullorum Disease, should be followed. (See Pullorum Disease, page 14). The treatment for Paratyphoid in older birds is more satisfactory. As in any germ disease, cleanliness and good care are important. Germozone should be used once a day in the drinking water (two tablespoonfuls to each gallon) for one week. Tonax, 2 pounds to each 100 pounds of mash, should be fed for two weeks, starting when the Germozone treatment is started. Birds that you can tell are sick should be removed from the rest of the flock and treated separately.

PEROSIS. In this condition there is a slipping of tendons that support the hock. (See picture above.) It is an easy trouble to diagnose, but by the time its crippling effect is noticed it is too late to do anything about it. Chicks with Perosis will often develop well in spite of the lameness.

Cause. Lack of sufficient Manganese in the ration is the chief cause of Perosis.



Bird affected with Perosis.

Rapid growth has something to do with it too, and therefore battery broiler raisers suffer heaviest loss from it. Nevertheless, it may appear in any flock on a diet too low in Manganese. Another substance, Choline, is necessary in the ration to prevent Perosis. There is some Choline in the bile and brain of animals, in fish meal and in egg yolk. But not enough is known about the amount of Choline in different poultry feeds to give directions for fortifying the ration with Choline.

Manganese is easily supplied. Four ounces of Manganese sulphate to each ton of feed is ample. Germozone in the drinking water and Tonax in the mash will help prevent Perosis.

POX. Outbreaks of Fowl Pox are rare in growing birds. However, the growing period is the best time for vaccination when this step is necessary. See Pox, page 43.

PULLET DISEASE. See Pullet Disease page 45. This trouble seldom occurs as far as known in birds under three months of age.

TRICHOMONIASIS. This is a disease which may affect all or any part of the digestive tract. It is caused by a single-celled parasite similar to that which causes Blackhead in turkeys, but usually Trichomoniasis is not so destructive as Black-

head. It attacks birds of any age, but more frequently during the growing period and during hot Summer months.

Symptoms. The symptoms closely resemble those of Coccidiosis: sleepiness, droopiness, a brownish or yellowish diarrhea which is often foamy, and rapid loss of weight.

Postmortem. On first opening the bird, you will notice a paleness of the internal organs. The ceca, or blind pouches at the lower end of the intestines, have a "ballooned" appearance. Split them open and you will find that they contain a brownish or yellowish, foamy material. In advanced cases there is a catarrhal condition in the organs that are affected, such as the crop, intestines, and ceca. That is, they are coated with mucus, and there may be peculiar cheesy formations of dead tissue found on them.

Treatment. The various factors involved in an outbreak of Trichomoniasis are not understood. Some faults in sanitation may be present and should be corrected. Trichomonads seem to thrive under damp, crowded conditions. Clean drinking water should be provided, although no antiseptic for it has proved specific for the disease.

WORMS. You cannot always tell by looking over your flock whether they have worms or not. Often if a bird that appears to be in good condition is killed and its intestines are split open, large numbers of worms may be found. Worms often go unnoticed in a flock until they have done a great deal of harm.

It is very rare to find worms in chicks under six weeks of age. But after chicks reach that age worms become a real danger for the whole life of the birds. Poultry frequently become quite heavily infested with worms even when the birds are on ground that is thought to be free of worm eggs. Even those reared in batteries sometimes become infested with Tape Worms.

At just what age poultry is hurt the most by worms it is hard to say. Many poultrymen think that the growing age is the most critical period of a bird's life. There can be no doubt but what worms do cause a great amount of damage during

that period. It is not often that worms actually kill a chicken. Their greatest damage is done by robbing the bird of feed. This makes it lose weight. The breast bone becomes sharp, and the head parts turn pale. Worms very often keep young birds from developing and putting on weight as they should. Also, they often cause considerable irritation to the lining of the intestines. The irritated parts of the intestines are good places for germs to develop and multiply. All of these things naturally lower the resistance of a bird and make her less able to resist any disease germs that she may pick up or breathe in. Therefore, you can be sure that worms frequently keep promising young birds from becoming good pullets.

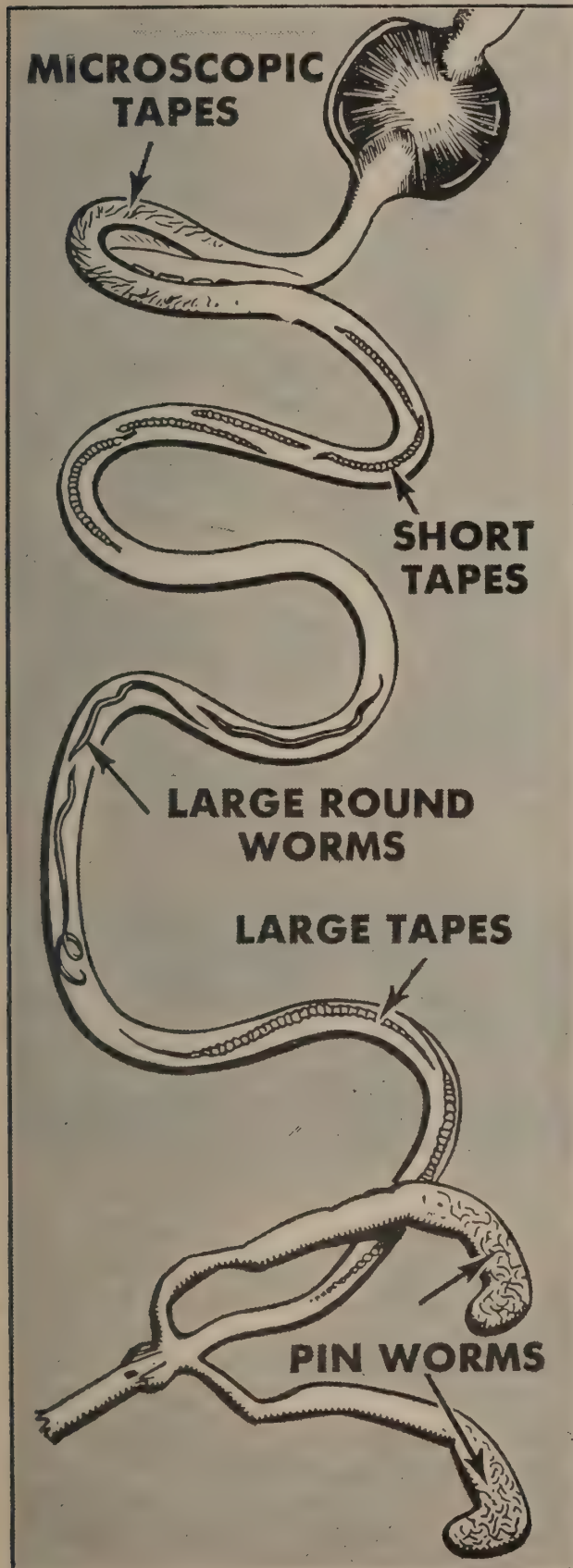
Worms in laying flocks may not cause so much loss of weight as they do in growing birds, but they do very seriously cut down egg production. And, as in growing birds, the natural resistance of a laying flock is lowered by worms.

There are three common kinds of poultry worms. The most common one is the Large Round Worm. This worm generally varies in length from one-half to 3 inches. It is a slender, wiry worm, pointed at both ends, and of a creamy color. Round Worms are found, usually, in the middle portion of the bird's intestines. The female Round Worm lays her eggs there. She may lay as many as 15,000 eggs at one time. The worm eggs are then carried out in the bird's droppings. When they are freshly passed they are not harmful to a bird that may pick up some of them. But after they have been incubated by being exposed to warmth and moisture on the ground for 10 to 16 days, they will infest birds that pick them up. Within 50 to 60 days from the time the female worm lays her eggs, another generation including thousands of female Round Worms can become fully developed and be laying fertile eggs.

Another common species of worms in poultry is the Pin Worm (Small Round Worm). Pin Worms are very small. They are shaped like the Large Round Worms, pointed at both ends, and are of the same color. Their body is not as thick as a sewing needle, and they grow to be only

about a quarter of an inch in length.

Pin Worms develop in the same way as the Large Round Worms; that is, the females lay eggs that are passed out in the

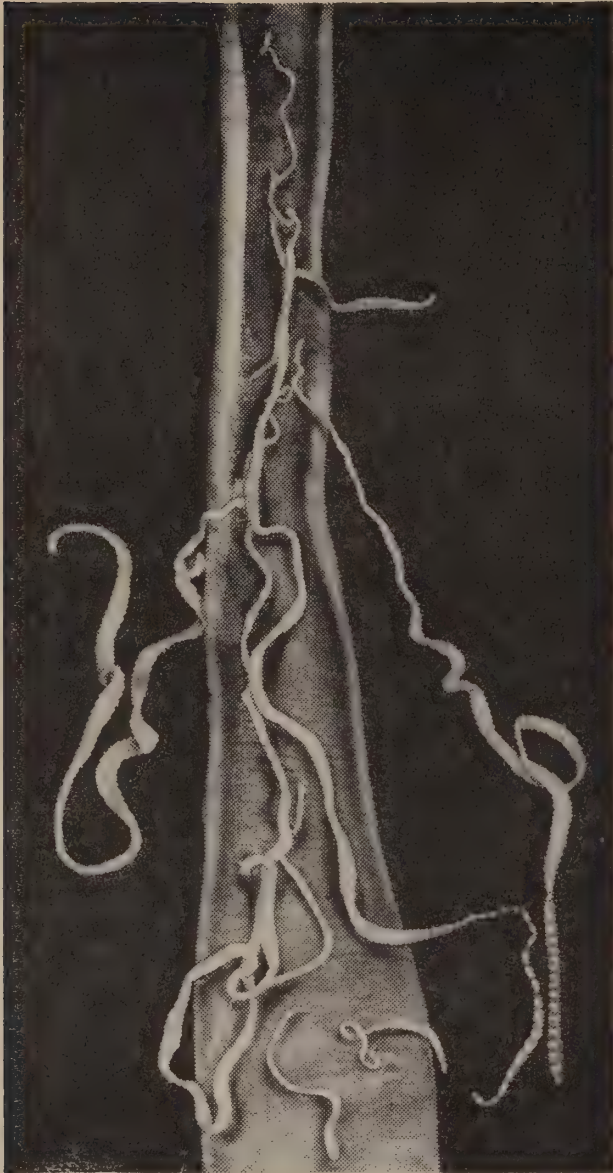


bird's droppings. After the worm eggs incubate on the ground, they will infest birds that pick them up. Pin Worms are found only in the ceca, or blind pouches that branch off from the lower part of the intestines. They are found in the tip, or blind end of the ceca. It is not definitely known just how much damage Pin Worms do. The organism that causes Blackhead is carried in Pin Worm eggs. In that way Pin Worms are the most common means of spreading Blackhead in chickens and turkeys. And it is very probable that Pin Worms themselves, like Large Round Worms, do serious damage to the birds.

Poultry Tape Worms differ in all respects from Round Worms and Pin Worms. In the first place, there are nine different kinds of Tape Worms which a chicken may have. They vary greatly in size. Some are so small they can scarcely be seen. Others run 1, 4, 6, 12 or even 16 inches in length. The extremely small kind is found in the loop of the intestines immediately back of the gizzard. The farther back in the intestines Tape Worms exist, the larger they grow.

All Tape Worms have heads equipped with small hooks and suckers. The head is so small it cannot be examined unless it is magnified. Back of the head of the larger species of tapes is a fine, threadlike neck, and behind the neck are a number of joints, called segments. The small kind of Tape Worms either have a very short neck or no neck at all and their chain of segments starts immediately back of the head. The "body" of a Tape Worm really consists of a chain of segments. They look somewhat like a string of pearl beads, and they increase in number as the worm grows in length.

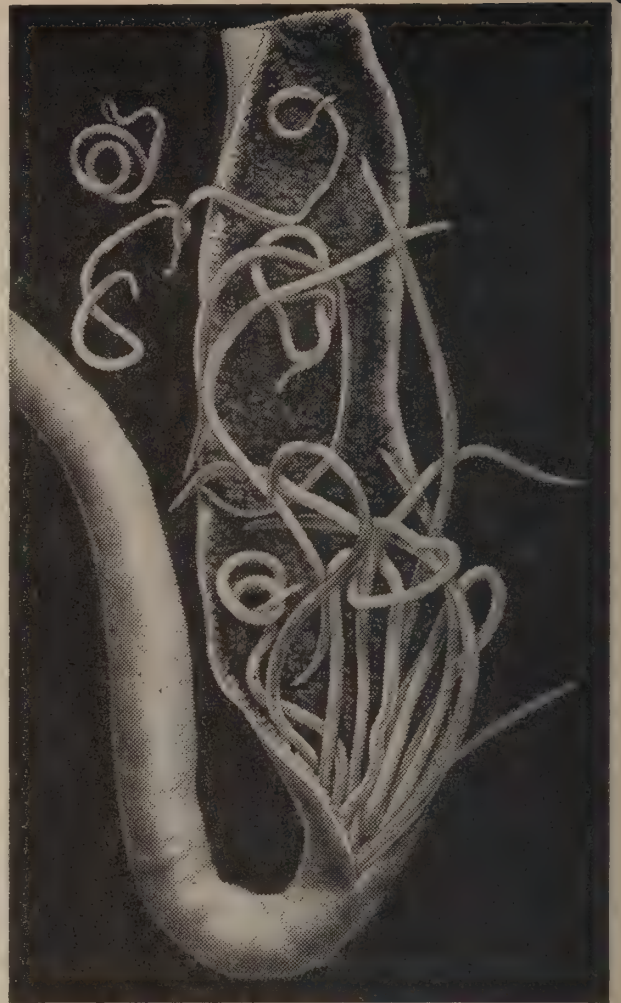
The end, or tail segments of a Tape Worm, contains eggs. The number of eggs varies in the different species of worms. Some tape segments contain as many as 200 eggs, while those of another species may contain only 8 or 10 eggs. When the tail segments become full of eggs, they drop off from the body of the Tape Worm, and are carried out in the droppings of the chicken. These "egg" segments are called "gravid," or "ripe" segments. For several hours after the gravid segments have been



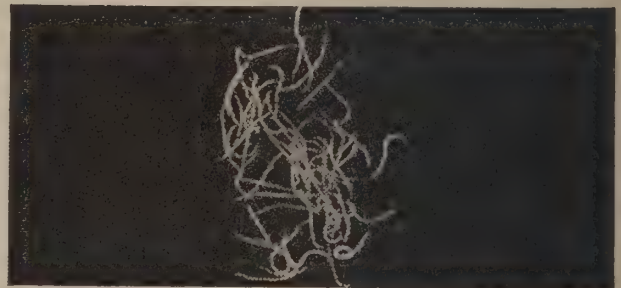
Large Tape Worms on Intestines. Note smallness of head at end upper right.

passed, they can be seen to stretch themselves out and to contract.

The question may be asked whether a chicken that picks up these gravid segments will become infested; or whether a Tape Worm passed by one bird can infest another bird that picks it up. The answer is "No." Before the eggs contained in a gravid segment can infest a bird, they must be eaten by one of the kinds of insects that are "intermediate hosts" for tape worm eggs. It is known that stable flies, earthworms, dung-beetles, grasshoppers, one species of red ant, and snails are intermediate hosts. There may be even more intermediate hosts than these that are known. After



Intestine partly split open showing common Large Round Worms.



A collection of Pin Worms taken from ceca.

such an insect has fed on a gravid segment, the tape eggs become embedded in the body of the insect. While there, a tape egg undergoes a change. The head of the worm gradually forms, and is even armed with its suckers and hooks. When a chicken eats the insect, the worm heads are released, probably as the insect is being ground up in the gizzard of the bird. The tiny tape heads then pass into the intestines and attach themselves to some portion

of the lining by means of their suckers and hooks. It is extremely interesting that each species of tape head will select its own definite part of the bird's intestines. The tape which is commonly called the "Microscopic" Tape Worm will attach itself only to the part immediately back of the gizzard, called the duodenal loop. The larger the species of tape, the farther back in the intestines it will attach itself. No one has been able to explain this. Then after the head has attached itself to the right place in the intestines, new segments begin to form back of that head, into a new chain, or "body."

With this understanding of the nature of worms and how they propagate, you can understand why it is important to keep growing birds entirely away from older fowls and, as far as you can, on ground that has not been used by other birds. Also you can understand why it is that even birds raised in wire batteries sometimes get Tape worms, because it is almost impossible to keep them from eating insects that may get into their feed or water. Letting your birds range near the farm buildings or manure piles where there are many flies and bugs, is always dangerous. If it is impossible to range them away from ground which is likely to have worm eggs in it, plow or spade the ground once a month, to turn under eggs that may have been incubating on the surface.

Control. Until chicks are about 4 months of age Large Round Worms are the most common species which seriously harm them. Any control program to protect against heavy infestation of Round Worms should be started early in the chick's life.

As soon as young chicks are well feathered and the weather is warm enough so that they no longer require heat, they

should be moved from the brooder quarters to ground which has not been occupied by older birds. If it is necessary to range the young birds on ground which has been occupied by older birds within the past year, such ground should first be plowed or spaded, to turn any worm eggs under.

Sanitation to prevent the development of Round Worm eggs should be practiced. The removal of droppings and litter, where birds are confined to a rather limited space, is a good practice. It should be removed every week or 10 days at most, and it should be promptly burned so that any worm eggs that may be in it will not become infective. Fill low, wet spots in the yards or runs, so that no water will stand in them.

A good feeding program during the first three months will do a great deal to cut down worm losses. A thorough study of this has been made by Dr. Ackert of Kansas State University in respect to Large Round Worms. Where nutrition is good, these worms have difficulty in establishing themselves. Getting clean food out of a hopper rather than foraging on contaminated ground is an obvious help to the bird.

Lee's Flock Wormer, page 62, can be used as early as ten weeks of age. Under average conditions a good program of medication is the use of Pullet Size Gizzard Capsules at the age of four months, followed by Adult Size Gizzard Capsules between the age of five and six months. This will reduce infestation at the critical time just before pullets start to lay, and help protect against large numbers of worm eggs accumulating in the laying houses, and yards that might be used for chicks the next year.

FROM RANGE TO LAYING HOUSE

WORMS. On range the young birds pick up many flies and insects. It is natural for chickens to do this because insects help to supply needed proteins. The trouble is that many of these insects contain tape worm "eggs." By the time the pullets are ready to go in the laying house many of

them may be quite heavily infested with Tape Worms and possibly with Round Worms and Pin Worms. Even birds raised on clean ground can get Round Worms and Pin Worms, as well as Tapes. The eggs of Round Worms and Pin Worms are too small to be seen. Often the wind will carry

seeds and particles of dust big enough to be seen, for miles. The wind carries worm eggs from one farm to another, too. Giving your birds clean range is the best thing you can do to prevent worms, but it is no assurance that your young pullets won't get worms.

The safest thing to do is to worm each pullet with a Medium (Pullet) Size Gizzard Capsule just before putting her in the laying house. No one can tell by looking at a chicken what kind of worms she may have. Frequently young pullets may be quite wormy and yet not show much external evidence of worms. Therefore it is best to use a treatment like Gizzard Capsules which are for all three kinds of worms, Large Round, Large Tape and Pin Worms. See pages 60-61.

COLDS. Often within a week or so after pullets are put in the laying house,

Colds start to develop. The birds are no longer getting the oxygen to which they were accustomed while on range. Also they are now in closer contact with one another. And all too frequently there are either drafts in which they sleep or poor ventilation. An outbreak of Colds is likely to cut down egg production for weeks or even months. You will do well to have a bottle of Leemulsion and some Vapo-Spray on hand, so that treatment can be started promptly at the first sneeze or sign of a watery eye or dirty beak. See pages 68 and 69.

CANNIBALISM. Some of the worst cases of Cannibalism occur shortly after the young pullets are confined in the laying house. Watch for signs of picking and if any appear, act quickly. A full discussion of Cannibalism will be found under that heading on page 34.

DON'TS

Don't overcrowd them. For light breeds allow 3½ square feet per bird, and heavy breeds 4 square feet.

Don't allow the litter to become damp. Keep at least 4 inches on the floor at all times.

Don't feed spoiled or musty feed. Use a fresh, well-balanced feed.

Don't let fountains or hoppers get dirty. Best to clean them each day.

Don't allow mites or lice to get a start. They are easily controlled with Lee's Mite Killer, Louse Powder, Perch Paint, or Blitspray.

Don't excite or frighten your layers. It sharply affects production.

Don't neglect the systematic use of Germozone. It reduces the danger of intestinal upsets.

Don't house pullets with older birds.



Care of Adult Birds

Years ago serious disease epidemics were seldom known. A farmer might have a little trouble now and then with parasites or disease in a few birds. But the average flock was small and had the entire farm to range over. Nine times out of ten the birds roosted in trees or on the barnyard fence. They did not come in such close contact with one another, so disease had little chance to spread.

Today it is much different. The poultry industry has shown a remarkably rapid growth. Some idea of its size may be had from the fact that a full carload of eggs, consisting of 400 thirty-dozen cases (144,000 eggs), is produced in the United States every two and three-fourths minutes, day and night, all through the year. With this growth

have come many new problems. The average flock is much bigger and has less ground to range. Most flocks now have good houses during the Fall and Winter. They receive the best of feed. Owners take steps to make them lay as many eggs as possible. Even lights are often used in the laying house to make the hens eat more and, therefore, lay more. All this is good business, but crowding the birds and forcing production have brought real problems of how to control both disease and parasites.

The housing of laying flocks greatly increases the danger of parasites and of disease too. And forcing production lays a heavy strain on birds and tends to lower their natural resistance to disease. When disease does break out in a laying



house it usually spreads to most all of the birds quickly.

Disease is now the poultryman's greatest risk. But he can do much to avoid disease and keep his layers in good condition for heavy egg production. It takes a little work and some expense but is well worth the effort and money. The old axiom "an ounce of prevention is worth a pound of cure" was never truer than it is here. It means the difference, often, between success and failure with your poultry, between a nice profit and an actual loss of money.

Management for eggs and profit starts back in the growing period, before the pullets are put in the laying house. If there was any Pox (Sorehead) on the premises last year, or if there is any Pox in the neighborhood, the growing birds should be vaccinated (See page 43). Also, before the pullets are put in the laying house, each one should be wormed with a Gizzard Capsule. If they are not wormed, probably there will soon be in the litter so many worm eggs passed by some pullets that do have worms, that most every bird will get wormy and egg production will fall to almost nothing.

Before the birds are put inside make sure that the house is in good repair. Replace any broken window glass. Loose boards on the siding should be nailed. See that there are no cracks to let a draft in the house. And be sure that the roof does not leak. There must be no drafty places in the house, and it must be kept dry. Nests and roosts should also be in good repair and properly arranged. Old droppings and litter should be removed. Thoroughly clean and disinfect the house. Then after it has dried out well, scatter plenty of clean, fresh litter on the floor. A deep litter is best, and it should be stirred up occasionally to keep it dry and to "bury" any worm eggs and the germs.

Give the roosts and dropping boards a good spraying with Lee's Mite Killer the day before the birds are put in. Lee's Mite Killer will destroy mites that are so common in poultry houses, and it protects against mites all through the winter months. This should give the young pullet flock

good, clean, comfortable laying quarters.

Also, after the birds are housed, disease must be guarded against. The intestines of all chickens contain germs. Most of these germs do not cause disease under normal conditions and if the birds are in dry quarters, free from drafts and are well fed. Then their natural resistance can probably hold the germs in check. But if a bird picks up too many of these germs, and they are allowed to "build up" in her intestines beyond the point where her system can control them they become harmful and may cause disease.

Then too, there are always some very dangerous germs lurking around in most every poultry house, in water, in feed, or in the litter. If a bird happens to pick up some of them, it is not long until she may become sick. Then they multiply in her rapidly and she spreads more of the same kind of dangerous germs in her droppings for other birds in the flock to pick up. And within a short time the entire flock is likely to come down with the same disease.

Not all disease can be prevented, but the dangers can be cut down very much if the floors, fountains and hoppers are kept well cleaned, and if Germozone is used in the drinking water twice a week or oftener. Germozone is very valuable in helping to keep disease germs down below the disease level.

Germozone destroys many disease germs with which it comes in contact right in the drinking water. And many germs do get into the water. They get on beaks as birds pick in litter and among droppings, and then they get washed off into the water when the birds drink. In that way they get inside of the birds and are likely to cause disease, if they are not destroyed in the fountain.

The idea is not to destroy every germ, but to keep disease germs down below the disease level, just as a man cultivates his corn to keep weeds down, not completely out. For this, Germozone given regularly, at least twice a week in the drinking water of adult birds, is usually enough if they are well. For use in laying flocks Germozone will be found much more economical when purchased in the larger sizes.

Diseases of Adult Birds

A sharp line cannot be drawn in all cases between diseases of the growing period and troubles in an adult flock. There are, however, certain differences in the two groups that make a separate discussion such as used in this book convenient for the poultryman. In order to save space, some troubles common to both are discussed in only one section. The threat of Coccidiosis (page 19) is definitely over at four months of age. It is only necessary to remember that older birds carry the parasite.

The Leukosis Complex (page 40) presents an entirely different problem. Lameness is the chief symptom noticed in young birds, and generally near the end of the growing period. All other symptoms occur most frequently in birds six months to one year of age. Pox (page 43) seldom appears before four months of age, but vaccination should be done early when necessary. Worms (page 24) can do much damage to young birds and hence are discussed under Diseases of Growing Birds. Acute nutritional diseases are rare in older birds. The commonest evidence of a poor diet for a pullet flock is lack of egg production.

BLOOD SPOTS. Blood spots in eggs are often quite a troublesome condition in some flocks. In the average size flock the eggs which contain blood spots are laid by one, or at most only a few birds. But identifying those birds is almost impossible. Small blood spots do not harm the egg for food purposes, but the consumer generally thinks they are spoiled. There are times when a considerable portion of the albumen, or white of the egg, may be so badly contaminated with blood as to give it the appearance of being almost pure blood. The only immediate solution for established customers is candling.

There are three principal causes of blood spots. One cause is due to the fact that when the yolk breaks loose from the egg-stalk, or egg cluster, to drop into the oviduct, or egg-tube, the small blood vessels do not recoil, as they normally should, and

therefore allow a small amount of blood to escape. The second, and probably the most common cause is due to an excessive irritation of the oviduct, or egg-tube, which causes a breaking down of some of the small blood vessels supplying the oviduct. This may allow a drop or two of blood to get into the egg before the shell is formed. The third cause, which is probably rare, is the localization of harmful germs in the ovaries, or yolks, which gain admittance into the bird's system through the drinking water. Blood spots occur most frequently in eggs laid by pullet flocks which have come into high production, and usually in these cases the trouble gradually disappears.

There is no specific means of correcting this trouble. The use of an additional one pint of a good grade of cod-liver-oil, or other fish-oil, to each 100 pounds of mash has often been of value in clearing up the trouble. Feeding green feed for a short time has also proven helpful at times. A good deep litter on the floor to prevent the premature rupture of the egg-yolk, as the birds fly down from the roosts, is also a precautionary measure. Two tablespoonfuls of Germozone added to each gallon of drinking water will help to assure against harmful germs which might gain admittance in the system through the medium of the water. Any radical change in feed is usually not desirable.

BOTULISM. This trouble is often called Limberneck because the muscles of the neck become paralyzed so that the bird is unable to raise its head from the ground. Botulism comes on quite suddenly, but usually only about two or three birds out of a hundred get it.

Cause. This trouble is caused by extremely poisonous substances that are given off by some germs found in decaying meat and vegetable matter. The germs that cause Botulism do not multiply in the birds and therefore Botulism is a poisoning, not a disease. Dead carcasses, like



Botulism exhibits a typical form of Prostration.

those of rats, chickens, pigs, or of other animals, should always be considered dangerous where chickens can get to them. Also some spoiled vegetables are just as dangerous as dead animals, especially canned beans.

Treatment. Wash out the crop with a Germozone solution, one tablespoonful to a quart of warm water, using a Lee Poultry Dosing Syringe if you have one. Empty the crop by holding the bird head down. Repeat this twice, and then fill the crop with the Germozone solution. Try to find what poisoned the birds, and bury or burn it so as to prevent the poisoning of other birds.

BRONCHITIS. Simple Bronchitis, Infectious Bronchitis, Laryngotracheitis and sometimes bad Colds all show symptoms of difficult breathing, gasping for air, and rattling or sneezing sounds. Even experts cannot tell one from another without making laboratory tests. That is why

poultrymen call any trouble in which birds have difficulty in breathing and show such symptoms, Bronchitis.

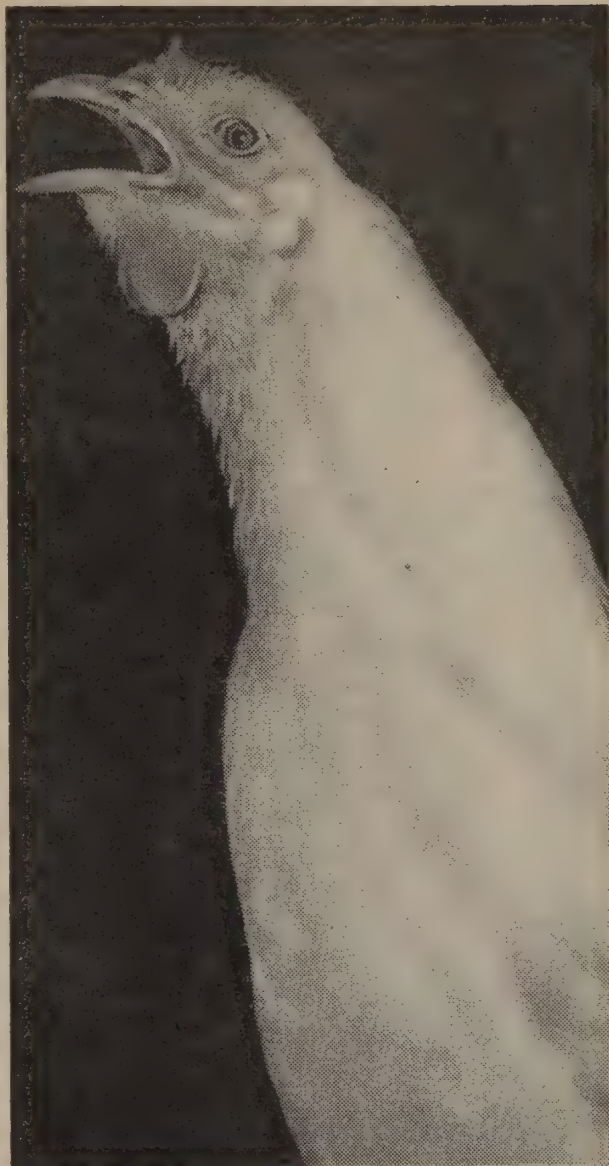
Colds are discussed on page 36. Although Laryngotracheitis is not very serious in young chicks, when adult birds get it, it is not usually helped much by treatment. See that title on page 39. However, as mentioned before, it is usually impossible to tell whether your birds have Laryngotracheitis or only a Cold or Bronchitis. It is true that Infectious Bronchitis is very dangerous for young chicks, but in adult fowls Bronchitis can usually be treated very successfully if the right kind of treatment is started soon enough. And Colds can be, too. Also, all of these diseases take the same kind of treatment. Therefore any time your birds have the symptoms described in this article start treatment—and start it promptly. For both Colds and Bronchitis it is very important for you to start the treatment just as soon as you can.

Symptoms. There is difficulty in breathing. The bird will occasionally extend its head and gasp for air. There are rattling or sneezing sounds which can be heard, especially at night after the birds have gone to roost. When laying flocks get these symptoms, egg production is likely to drop very rapidly. The bird chokes to death because of phlegm or mucus that collects in the windpipe. This strangling makes the comb turn to a dark purple just before death or shortly after the bird dies.

Postmortem. There is little change inside the bird's body except that if you split open the windpipe you will find its lining to be inflamed. Usually the windpipe has in it mucus or phlegm which is likely to be streaked with blood.

Treatment. Three things should be considered in treating diseases of the air passages. *First*, see that the birds have comfortable and clean, dry quarters. *Second*, the mucus that forms in the windpipe must be removed, as much as possible, in order to keep the birds from choking to death. Vapo-Spray is very useful for this. After the birds have gone to roost, close the house reasonably tight and spray Vapo-Spray over their heads until you have made a light fog, or mist. Repeat this every two hours until they have had three sprayings. Spray twice during the day; in the morning and again at noon. Keep this up as long as necessary. *Third*, from the first, give Leemulsion, either in the drinking water or in the mash. If you give it in the drinking water, use one tablespoonful of Leemulsion to each gallon. If you put it in the feed, give one tablespoonful for each 50 fowls. This will aid in relieving the inflammation. Continue the Leemulsion in all drinking water or in each feed for three days. After three days if treatment should be kept up, Vapo-Spray alone may be used. Read about both Leemulsion and Vapo-Spray on pages 68 and 69.

BUMBLEFOOT. This is the name for an abscess on the ball, or bottom of the foot. It is caused by an injury or bruise. In scratching, birds sometimes break the skin of the pad, or ball of the foot. Then



Hen affected with Bronchitis.

germs, especially pus-producing ones, may get into the opening. An infection results, similar to a boil, with deep cores. Birds sometimes get Bumblefoot by flying or jumping from high roosts to floors not covered with enough litter to avoid bruising.

Symptoms. This trouble is seldom noticed until the bird gets lame. Then if you look at the bottom of its foot, you find a swelling on the pad and usually one or two scabs on it. If you remove the scabs, you will find cores like those of a boil. They usually run well down into the pad of the foot.

Treatment. The cores are dead tissue and must be removed. If you cannot

squeeze them out, try to remove them with the sharp point of a stick. If that does not work, split the pad of the foot with a sharp knife deeply enough so that all of the cores can be removed. After you get the cores out, pour full strength Germozone into the wound. Make sure it gets clear inside to the bottom of the wound, and then bandage the foot. Put the bird in a small coop so it can be kept quiet for a few days. Generally one treatment will do but, if not, the treatment should be repeated on the third day.

CANNIBALISM. Cannibalism is not a disease. It is a habit but it causes as much loss as most infectious diseases cause.

Late in the growing season some flocks start feather pulling. This should be taken as a warning that such a flock is quite likely to develop the habit of Cannibalism when the birds are put into the laying house. Sometimes birds will start picking one another within a few days after they are housed. This is more likely if they are overcrowded. (Light breeds should have $3\frac{1}{2}$ square feet of space, and heavy breeds 4 square feet per bird.) Heavy losses are frequently suffered from the vicious habit, especially among Leghorn pullets, shortly after they are housed.

Usually Cannibalism is most serious after the pullets come into lay. As pullets start to lay, their eggs are often misshaped. Some are small, of "pee-wee" size, while others are even larger than normal. Sometimes, as a result, the oviduct, or egg tube of some young pullet turns wrong side out. This is called Eversion, or Prolapse of the Oviduct. People sometimes call such cases "Blow-outs." The mass of tissue outside of the vent is of a blood, or dark red color. It naturally attracts the attention of other birds, and they take a pick at it. Often such picks draw blood—and once the others get a taste of the blood it is not long until they pick the suffering bird beyond hope of recovery. In some outbreaks the habit may become so vicious that they will even pull the entrails out.

Many things have been proposed to cure Cannibalism. Some poultrymen and scientists were of the opinion that it was a

feed problem. But experiments of changing the protein contents in the feed did not prove that a change in diet would break the habit. It was then thought that possibly the birds did not get enough salt, so an extra 1% of salt was added to the ration, but no marked results could be noticed in many cases.

Different kinds of mechanical devices for fastening to the beaks of pullets are on the market. The best ones have been very successful.

The feeding of whole oats or whole barley, kept in hoppers before the flock from the start of the growing period, has also proved well worth while. The fiber hull of these grains seems to contain a substance that keeps down Prolapse, and when Prolapse does not occur there is not so much danger of serious Cannibalism. The prompt use of Pickpaste at the first sign of picking and before the habit becomes strong, will help, if the young birds are not overcrowded. (See page 76.)

CHOLERA. Cholera never occurs in young chicks, and seldom in growing birds, but it often breaks out in flocks after they have been housed. For that reason the heaviest losses from Cholera come during the Fall and Winter. The disease is caused by a specific kind of germ which multiplies very rapidly in the blood stream. Cholera takes one or the other of two forms, either acute or chronic.

Symptoms. Acute Cholera comes on very suddenly and often causes heavy loss. Some birds may drop dead from the roost or die on the nest. This is especially true of very fat birds. But in the normal attack the bird will show evidence of being sick for three or four days.

In the very acute form of Cholera there are no outward symptoms because the birds die so quickly. But in the average acute case there is a greenish or yellowish diarrhea. A thick, sticky mucus forms in the mouth and throat, and sometimes it causes a rattling noise when the bird breathes. The appetite is poor but a high fever causes an increased thirst. The comb and wattles often become purplish in color and the bird acts sleepy. The feathers



about the vent generally become badly smeared as the result of the severe diarrhea.

The chronic form is generally a "hang-over" from an acute outbreak. Probably because of an unusually strong resistance, some of the birds not only came through the acute attack, but did not even show the symptoms of the acute form. In the chronic form the birds are sick but they do not have the severe symptoms of the acute disease and they sometimes linger for several weeks before dying. In these cases there may be no diarrhea and the comb becomes pale. The bird gradually gets weak and thin, even though the appetite remains fairly good.

Some birds get over Cholera and appear quite normal. But they will always be carriers of the Cholera germs and are likely to cause an acute outbreak if they are put with a healthy flock.

Cholera germs are often found as one of the kinds of germs in the mixed infection in some cases of Roup. See Roup, page 46. Again, they may combine with the virus of Laryngotracheitis or of Bronchitis in the windpipe or in the bronchial tubes. See Bronchitis, page 32. Sometimes the Chol-

era germs will center their attack on the wattles. Then the wattles may get two or three times their natural size and may become hard.

Postmortem. In acute cases very small red spots will be found in the ring of fat around the top of the heart, or in the heart muscle. Small yellowish and red spots are commonly found on the surface of the liver. The intestines, just back of the gizzard, are often a fiery red on the inside. The blood vessels, especially those supplying the internal organs, appear to be almost bursting with blood. The skin may be quite pink instead of the white or yellow color which is normal. The breast muscles under the skin are generally of a reddish color much darker than normal.

In chronic Cholera the disease germs may attack any part of the bird's body, and abscesses may be found in any of the internal organs or in the joints or wattles. The sac around the heart may be filled with a straw colored fluid, and quite often there is a hard, cheesy mass in the air sacs near the lungs. The liver is generally either much darker or considerably lighter in color than normal. The part of the intestines immediately back of the gizzard will usually contain a yellowish, sticky material. Very often a dried, yellowish, cheesy material, like a cooked egg-yolk will be found in among the intestines, or on some of the internal organs.

Treatment. Medicines are of limited value, and in acute Cholera are usually of no value for curing birds. In fact, it is not desirable to "cure" birds that actually come down with Cholera, because they would be carriers of the disease. It is better to get rid of them and to do all you can to get rid of the infection in your flock and to keep well birds from getting Cholera. You can do much by vigorous sanitation and by building up the natural resistance of the well birds so that they can overcome the germs that do get into their systems or can keep them below the disease level. Prompt removal of dead birds, and killing and burning of sick ones, should be the first step. Then clean and disinfect the buildings and equipment. Every effort should be made to build up the resistance

of the entire flock. For this purpose Tonax, two pounds to each one hundred pounds of mash, should be fed for one week. After the first week Tonax can be reduced to one pound per one hundred pounds of mash. Germozone, two table-spoonfuls to each gallon of drinking water, is not only helpful in preventing the spread of Cholera germs through the water, but it is also of value in relieving the irritation of the lining of the intestines. Vaccination is sometimes practical, but its results vary a good bit.

COLDS (SIMPLE CORYZA). Probably close to 90% of the average poultryman's disease problems are Worms, Coccidiosis, and Colds. The term, Cold, is used for a number of common symptoms—just as it is for Colds in human beings. In mild Colds perhaps the only symptom that will be noticed is a frequent shaking of the head. In such mild cases there probably is not even a drop in egg production—at that stage. But in other cases Colds may be much worse and may show watery eyes, running nostrils, dirty, wet beaks, and even may run into Ocular Roup. In these bad cases there is usually a marked falling off in mash consumption, and also in egg production. You can tell a Cold—even a bad one—from Ocular Roup because in Ocular Roup there is a foul odor.

A Cold should never be neglected, even a mild one, because it is frequently the forerunner of more serious troubles. This is especially true in laying flocks. A sharp drop in egg production often results from a Cold. And a Fall Cold, if not promptly treated, may result in a big loss of eggs all through the Winter. Also, a severe case of Ocular Roup may follow a neglected Cold, and is likely to cause you a heavy loss of valuable birds.

Cause. The true cause of Colds has not been learned in spite of a great deal of research in human medicine and in veterinary medicine. Just as a mother often can say correctly "Little Johnny has a Cold because he went without an overcoat and got his feet wet," so it may also be true that "My pullets have a Cold because they

were crowded in a damp house." These two statements both bring out the fact that—regardless of the real cause of Colds—Colds do frequently follow faulty management.

People often think of Colds in connection with Fall and Winter months. The fact is that some of the worst Colds—in poultry and people—are "Summer Colds."

Treatment. Provide proper ventilation, without drafts, and avoid overcrowding. Keep the house clean and dry. Include in the ration, mash containing alfalfa leaf meal and Cod Liver Oil. Add Tonax to the mash, one pound to each one hundred pounds of mash or, if you have only a few birds, one ounce to six pounds. See page 64. Spray with Vapo-Spray (page 69) two or three times in the evening after the birds have gone to roost. It is good to use Leemulsion, too, (page 68) either in the drinking water or in the feed.

Many poultrymen prefer to put Germozone in the drinking water instead of Leemulsion. This has been a practice of thousands of poultrymen for a great many years, and apparently with good results. The Germozone helps the birds overcome an irritation in the intestines which is very common in Colds. But Leemulsion can be expected to give prompter results for Colds than Germozone alone. Many poultry raisers use both when their birds have a Cold, Germozone in the morning drink and Leemulsion in the drinking water given in the afternoon. But Vapo-Spray should always be used.

EGG EATING. A habit related to mild forms of cannibalism that may cause some trouble to flock owners. The underlying cause is usually lack of diligence in providing adequate nesting facilities. Nests should be provided for pullets in anticipation of the lay, and sufficient nests should be afforded to take care of heavy production. Eggs should be collected three times a day, and remember that the morning is usually the time of heaviest production.

Like all habits, egg eating can be stopped most easily in the early stages. Provide one nest for every six hens. Chickens still prefer privacy in laying, just as their wild

sisters instinctively seek a quiet protected spot. If a dark area of the house wall cannot be used, cover the nest entrance with curtains that combine protection with easy access. Collect eggs five times each day for a week or so, until the trouble is no longer noticed.

In connection with this habit, china eggs are sometimes quite useful when they can be obtained. These artificial eggs were used at one time to encourage laying. For various good reasons this practice has disappeared, but glass or china eggs do seem to discourage the habit of picking at eggs. At times it is advisable to remove bad offenders from the flock when detected.

EXTERNAL PARASITES. There are quite a number of external parasites of chickens and turkeys. The more common are Lice, Mites, Bluebugs, and Fleas. These parasites are very annoying and ir-

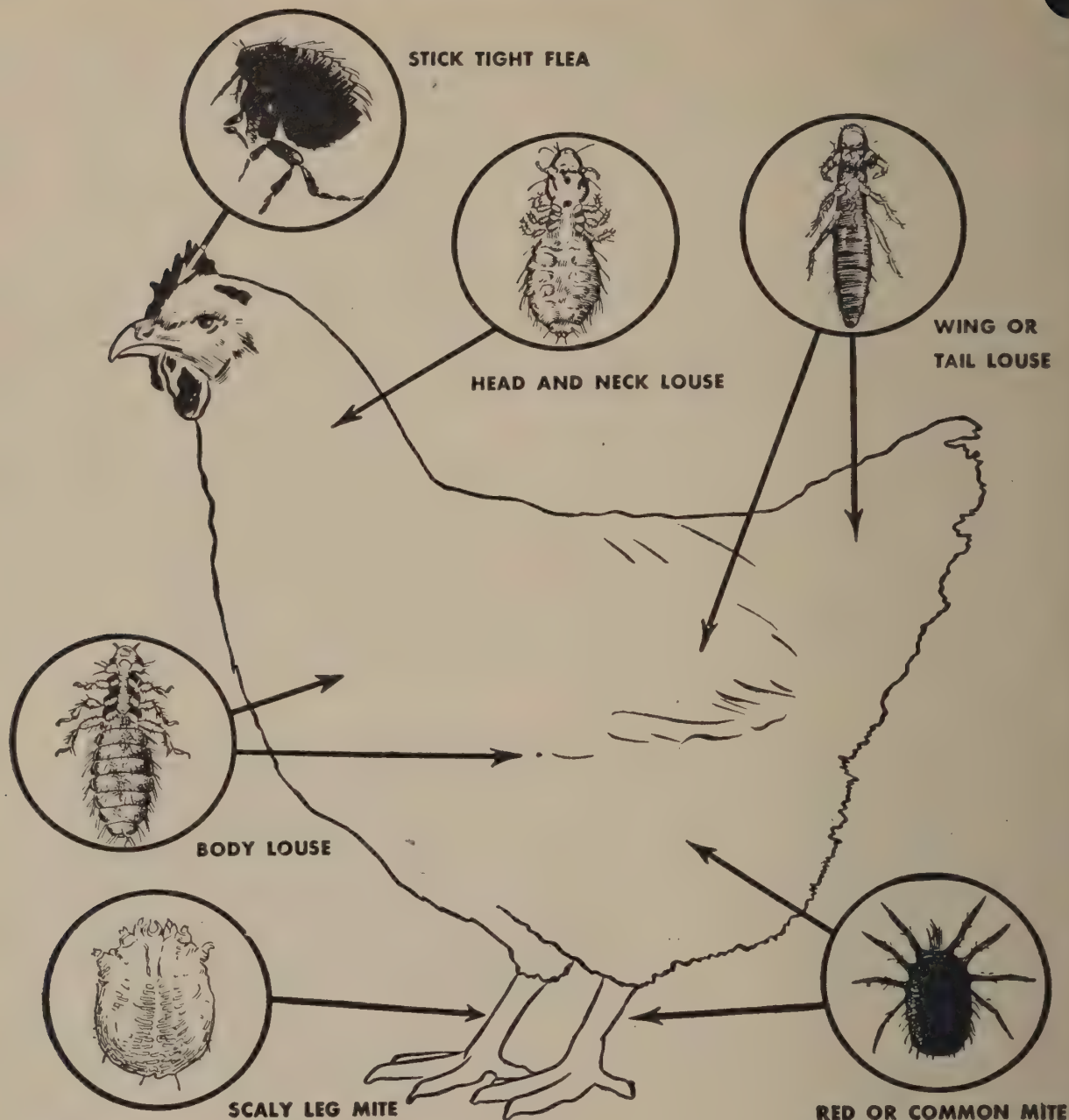
ritating to birds and they cause heavy losses. Their losses run into the millions of dollars every year. They check proper development of growing birds, they cut down egg production, and they bring about poor fertilization of eggs. Sometimes they even cause death, especially in young birds.

Frequent examination for Lice should be made. Every week or so pick up a bird and run your fingers through its feathers and fluff, to see if there are any Lice on it. Lice are small, about the size of a pin head, and are grayish in color. They can move fast, therefore you have to look closely for them. Lice are not hard to control or to clean up. See pages 71-76 for treatments.

For every louse that can be seen on a bird, there are many baby Lice very hard to see and many Lice eggs. Most treatments are effective against both large and small Lice, but not against eggs. Hence it



Lice Driven to Surface of Feathers by Blitspray.



Showing common location of external parasites which attack chickens.
These pests cause a great deal of damage.

is often necessary to repeat the application of an insecticide in from ten days to two weeks. This will remove the small Lice hatched from eggs before they are mature enough to lay eggs themselves.

This second treatment is not always required. For reasons not completely understood, a treatment that is not 100% efficient by careful test may give very effective Lice control from a practical standpoint. This is true for many parasites. Natural resistance to parasites may break

down for one reason or another and allow rapid multiplication. Removal of most of the parasites results in relieving overtaxed resistance factors to a point where they again become adequate.

SHAFT LICE get their name because they run along the feather shaft when disturbed. These are the kind that hop on a person handling lousy birds. They are probably the most common lice on mature birds, often occur in enormous numbers, and cause chickens much annoyance.

BODY LICE. Rather large, light brown lice that can bore into growing feather shafts and bite skin to get blood. These thrive on birds over four months, and cause grey "lice egg" clusters on feathers around the vent as well as extensive skin damage.

HEAD LICE can hurt young chicks and older flocks where beak devices are used.

RED MITES. The habits of Mites are different from those of Lice. During the day Mites hide in the cracks and crevices of the roosts, walls and nest boxes. Then at night when the birds have gone to roost, they come out of their hiding places and swarm over the birds. These blood-suckers then fill themselves up with blood of the birds, so full that they change from gray to red. That is why they are called Red Mites. Mites pester the birds all night so that they cannot get their needed rest. They are one of the most destructive of all parasites and can tear down the natural resistance and health of a flock quickly. They are even suspected of spreading Paralysis and Pox. The liberal use of Lee's Mite Killer (pages 72 and 73) will clean out the Mites. Two good sprayings a year with Lee's Mite Killer will keep the house free from Mites.

BLUEBUGS. Bluebugs, or Fowl Ticks, are common in the South, especially in the Southwestern States. Their habits are



Bluebugs on skin of fowl.

similar to those of the Red Mites. They attack the birds mostly at night, and hide in cracks and crevices of the poultry house

during the day. And, like Mites, they are blood-suckers. They are hard to get rid of, once they get a good start in a poultry house. Spraying the house well, even the ceiling, with Lee's Mite Killer at one week intervals, is the best thing to do. This must be kept up for three or four weeks.

STICKTIGHT FLEAS. In the South poultry raisers are often troubled with Sticktight Fleas. These pests breed in dust on floors of the house and in yards. Like Bluebugs and Mites, they are blood-suckers. They attach themselves to the head or under the wings of a bird and usually form in clumps or clusters. Because they cling so tightly the name Sticktight Fleas has been given them.

They can usually be prevented by scattering Lee's Dri-Rub in houses and breeding places, using 1 pound for every area five feet square. (4 pounds per 100 square feet). Spray houses with Lee's Mite Killer. Blitspray can be sprayed directly on the heads of birds over four months of age.

FEATHER MITES. There is a true Feather Mite, often called the Northern Fowl Mite. It resembles the common Red Mite in everything except daytime habits. The Red Mite attacks the bird only at night, but the Feather Mite spends its entire life on the bird. The Feather Mite will be found chiefly around the vent and tail, and the fluff around the vent is often soiled.

Treatment. Any Mites found on the birds during the day can best be treated with Perch Paint. Use it as directed on page 71.

LARYNGOTRACHEITIS. This disease presents quite a problem for both the poultryman and hatcheryman. It is impossible for them to tell it from Infectious Bronchitis and from some of the infectious forms of Colds. In all of these diseases, gasping is the chief symptom, and the only way they can be told from one another is by laboratory examination.

Laryngotracheitis is a virus disease. That means that it is caused by an organism too small to be seen even with a microscope. In acute outbreaks it affects the opening into the windpipe, called the

larynx, and also the trachea, or windpipe. That is why it is named Laryngotracheitis, which means an inflammation of those parts. In the less acute cases the inflammation may not be so bad, but in such cases the inflammation usually reaches up into the air passages of the head, and to the membranes of the eyes. Then we have symptoms like those of Roup. Laryngotracheitis may affect birds of all ages but, it is usually very mild in young chicks and often causes little or no losses among them. The older the birds are when attacked, the worse the attack usually is. In laying flocks, besides a big drop in egg production, the deaths often run as high as 70% of the entire flock.

Acute outbreaks come on very suddenly and run a rapid course of about one week. Less acute outbreaks may run for many weeks and the poultryman may suspect either bad Colds or Roup.

Symptoms. In acute cases the bird extends its head and gasps with almost every breath, but in the less acute cases the birds do not gasp so often. In older birds, if the attack comes on suddenly and spreads rapidly it is a pretty safe bet that it is Laryngotracheitis. In young chicks it is more likely to be Infectious Bronchitis. See Bronchitis, page 10.

Postmortem. If the case is acute, there will be an inflammation of the membranes of the larynx. Also there will be bloody mucus in the windpipe. In less severe cases, very little change will be found in the larynx and windpipe, but there may be a reddening of the lining of the eyelids.

Treatment. In severe outbreaks no treatment seems to be of much value. But since this disease so closely resembles several of the other diseases of the breathing passages which can be successfully treated, the only sensible thing to do when your birds start gasping is to figure that the trouble may be one of those diseases and start treatment for them. Use Vapo-Spray and Leemulsion according to directions described on pages 68 and 69. The virus causing this disease is killed by one part of Lee's Creosote Dip in 80 parts of water. Following any outbreak of this disease disinfect the buildings and equipment

thoroughly with that solution after burning all of the old litter and carefully cleaning up fountains, feeders, roosts and nest boxes.

Vaccinating birds over two months of age is sometimes practiced, with good results. The vaccine should not be used on premises where this disease has not occurred, nor has it any value after the disease breaks out. Cleanliness and good care should be practiced in all instances during, and following an outbreak. See Bronchitis, page 32.

LAXATIVES. There are times when a flock should be given a laxative. But be careful not to give your birds too strong a dose. Epsom Salts is a common poultry purge. It is as satisfactory as any, is easily given, and is inexpensive. If a laxative is needed, give Epsom Salts. Put the amount of salts in the amount of drinking water recommended below and give it to your birds the first thing in the morning, a short time before you feed them. Leave it before them for about three hours. Then take it away and give them plain water.

For birds of 4 months or older, give 1 half pound of salts to 2 gallons of water for 100 birds. For fewer, 1 ounce of salts in 1 quart of water for each 12 birds.

For half-grown birds, use one-half of that much salts but in the same amount of water.

For chicks, not over 2 heaping teaspoonfuls of salts to a gallon of water. Do not dose them again for at least a week.

LEUKOSIS COMPLEX. Leukosis Complex is known also by such names as fowl paralysis, range paralysis, big liver disease, grey eye and leukemia. These names refer more to the symptoms which are likely to be observed with the disease than to disease itself. Leukosis is detected most easily when the nerves of birds are affected, causing paralysis of the legs or wings or either greying or blinding of the eyes. Other forms of the disease produce lesions in the liver, spleen, kidneys, heart, lungs or bones. As the name implies, leukosis complex is a very complex disease and one of the most common of poultry

troubles. Losses from the various forms of the disease run into millions of dollars each year. Only a small number of birds are affected at one time; possibly only one or two a week may be lost out of a flock of 100 birds, but these losses may continue for a considerable length of time. The greatest losses occur between the ages of three months and one year although younger or older birds are affected sometimes.

Cause. The exact cause of leukosis is unknown. Some poultry experts believe that the disease may be due to a virus, but absolute proof is lacking. Still other authorities believe that the lack of certain vitamins, bacterial toxins (poisons) or sex hormones may influence or cause the disease. Whatever the cause may be, there is considerable evidence that the disease passes through the egg to the chick in much the same manner as pullorum disease. And there is also evidence which seems to indicate that the disease can be spread from one bird to another by contact. It is always advisable to separate

any sick birds from the flock as soon as their condition is noticed on the theory that leukosis may be spread like other infectious diseases.

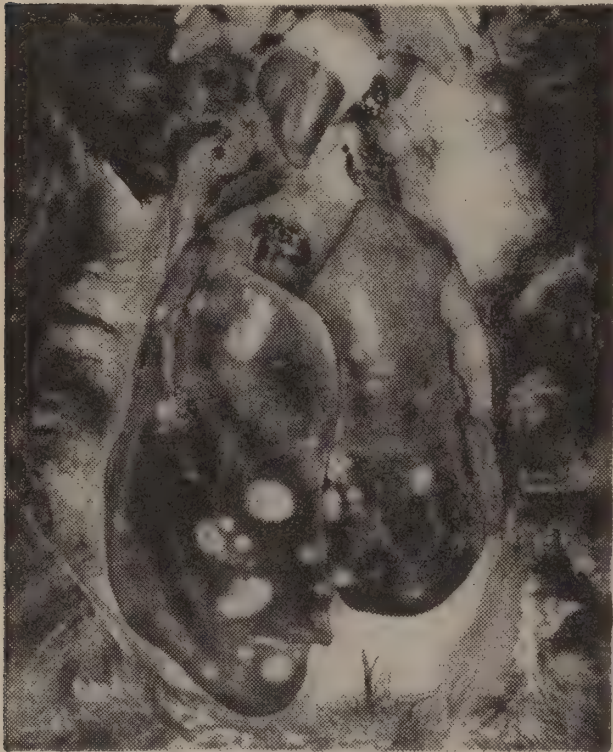
PARALYSIS. This form of leukosis, commonly known as fowl paralysis, affects one or both legs or wings. If the legs are affected, the bird will first show difficulty in walking and then go down on its breast or side, generally with one leg stretched forward and the other backward. If the wing is affected, it droops very noticeably. The bird's appetite remains good, however, and, except for inability to stand or walk, the bird appears perfectly normal. Upon postmortem examination the nerves which go to the affected leg or wing will be found to be enlarged and sometimes three times normal size.

BIG LIVER Large livers are only one indication of leukosis, affecting the internal organs. Sometimes the livers are enlarged only slightly but are more often two to four times their normal size. The liver, in some cases, may bear small white spots or spots which may be as large as the



Paralyzed Birds have the Nerve type of Leukosis.

end of one's thumb. These spots must not be confused with those seen in tuberculosis. The spots in tuberculosis are easily peeled out and are rather hard to smash while those of leukosis are comparatively soft. The spleen may be enlarged to three or four times normal size, and the kidneys



*Liver Degeneration from Leukosis.
Liver is greatly enlarged and often spotted.*

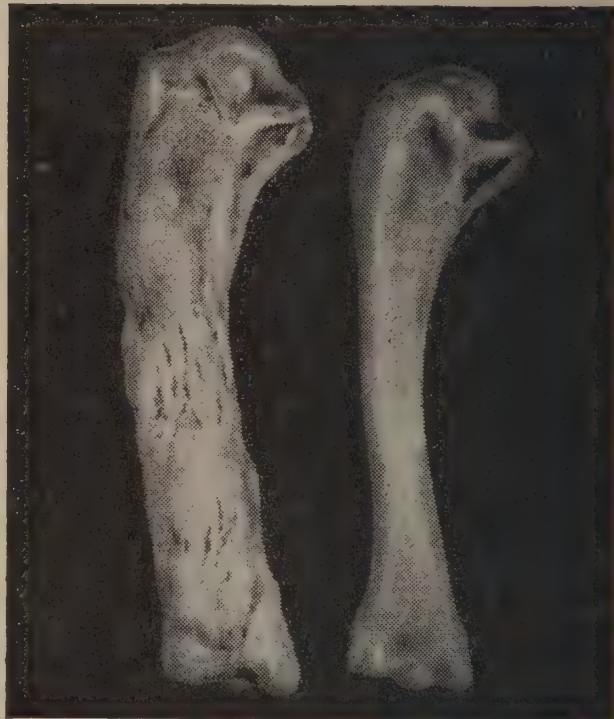
may show slight enlargement. These conditions are seen most often in birds during the first laying season. One or two hens of a unit will be found every few days to have ceased egg production and become pale about the head. These may die within a week or ten days. A high loss of birds may result over a period of several months.



*Form of Leukosis affecting eye, called
"Gray Eye" or better, "Fish Eye."*

Gray Eye. This form of leukosis affects one or both eyes. The normal color of the eye gradually changes to gray, the pupil becomes irregular and, in the final stage, the eye is opaque with a pin-point pupil. When the latter phase is reached the eye is blind.

Thick Leg. In this form of leukosis, which is rare, the leg bones are affected and become thickened. Other bones throughout the body are also effected.



*Leukosis of Bone—an uncommon form.
Left: Diseased. Right; Normal.*

Resistance. The resistance of a flock to the development of the supposed Paralysis virus is important. All progress that has been made has resulted from building up or making use of the birds' resistance. The exact nature of protection, or resistance to the disease is not known. Many facts seem to indicate that it is hereditary and, therefore, does not come from contact with the disease organism. For example, in a flock of mixed Leghorn, Rock, and Wyandotte pullets running together, Paralysis may cause loss in any one of the breeds and not in the other two. And by saving the pullets from the affected breed for a year, after carefully culling out all of those with any symptoms of Paralysis, you



Normal nerves. These are easily found by removing the kidneys carefully.



Enlarged Nerves are found in Paralyzed Birds.

can get from the ones that are kept, offspring which will show high resistance to Paralysis.

Besides breeding, sanitation plays an important part in building up resistance. Natural resistance may not come from exposure to the disease, and too much exposure may break down a bird's resistance. For this reason, growing chickens should not be allowed to run with older stock. Good general sanitation should be practiced, and measures should be taken to avoid damage from coccidia, lice, mites, and worms. All of these things tend to break down the natural resistance.

Treatment. There is no cure for developed cases of Paralysis, and it is not practical or profitable to try to treat affected birds. Instead, make every effort to avoid continued losses. Cull all birds showing any external symptoms of Paralysis and those that lack vigor. Tonics are not cures but a good tonic offers more help than other medicines. Give Tonax (page 64) in the

mash for one week at the rate of 2 pounds to each 100 pounds of mash, thoroughly mixed. Then continue the use of 1 pound of Tonax to 100 pounds of mash. This is to help build up the natural resistance of the unaffected birds. Success is measured not by the prevention of all loss, but by the general health of the birds you keep and by their production.

PARATYPHOID. (See Paratyphoid, page 23.)

POX. This disease is called by several different names: Chicken Pox, Fowl Pox, Avian Diphtheria, or Sorehead. Pox is a highly infectious disease, and it breaks out in all parts of the world where chickens are raised. It is more frequent during the Fall and Winter months, and therefore it affects pullets more than younger birds.

There are two forms of Pox. One form, the skin type, affects the unfeathered parts of the body, especially the comb and wattles. The first sign of this form of the disease will be small, raised, grayish blister-like spots. They gradually grow larger and turn into brownish-black scabs. In the milder cases there may be only a few scabs. But there are often many scabs on the comb, face, and wattles, in the more severe cases. The scabs become very dry and hard. Within two to four weeks they drop off and leave whitish, or grayish spots which gradually become normal in color.

The other form, the Diphtheritic form (sometimes called the canker type), affects the throat and mouth. In this form of the disease, raised yellowish cankers form in the mouth or throat. Sometimes the cankers become so large that the bird cannot close its mouth. Occasionally, they form at the opening into the windpipe. Then they seriously interfere with breathing, and sometimes even choke the bird to death.

In many outbreaks of Pox some birds will have both the skin form and the canker form. In addition, their eyes may become inflamed. Then there is a watery discharge, or a yellowish cheesy mass may form in either eye. This causes the eye to bulge and gives it a swollen, or puffy appearance.



Severe case of Fowl Pox.

Chicks under six weeks of age get only the Diphtheritic form of Pox. When they do get it, cankers form in the mouth, especially at the corners. Often they become so large that the chick is unable to eat. Pox is not so common in young chicks, but when it does attack them the losses are often very high.

In pullets and older birds, Pox is always serious. The skin form may cause only few deaths, if any, but it seriously hurts egg production. An outbreak in the Fall may cut down egg production all through the Winter. The canker form is even more serious and often causes rather heavy death loss besides the loss in production.

Prevention. Pox can be almost completely prevented by vaccination. The surest way is to use the chicken strain of vaccine, and to vaccinate during the growing period. Usually the best time to vaccinate is when the birds are about 8 to 10 weeks of age. Do not vaccinate pullet flocks about

ready to lay, or just starting to lay. In such cases vaccination may be more costly than the disease itself.

Treatment. Once Pox has become well started in a flock, it is difficult to treat. If it is the canker form, remove the cankers with a small pair of tweezers and then paint the sores with undiluted Germozone. In the same way, pick off scabs on the comb and wattles and paint those sores with full strength Germozone. Do all you can to keep the birds comfortable and to build up their strength. Two things are of value in building up their resistance. First, add two pounds of Tonax to each one hundred pounds of mash and feed this mash mixture for three weeks. (About Tonax, see page 64.) Second, give Germozone, two tablespoonfuls to each gallon of drinking water, every other day for the same three-week period. (See pages 55 and 56 regarding Germozone and how it acts.)

PULLET DISEASE. This trouble is often referred to as "Bluecomb" because of the very dark comb on birds dying from it. The disease is not understood at the present time. Some workers believe an upset of the sodium-potassium balance occurs. Poultry raisers have suspected the feeding of new wheat in mash or grain or from foraging as a possible cause. Pullet Disease is probably nutritional rather than infectious in origin, even though a bad outbreak can greatly resemble chronic Cholera. It is not a deficiency disease, however, but involves a metabolic upset similar to visceral gout.

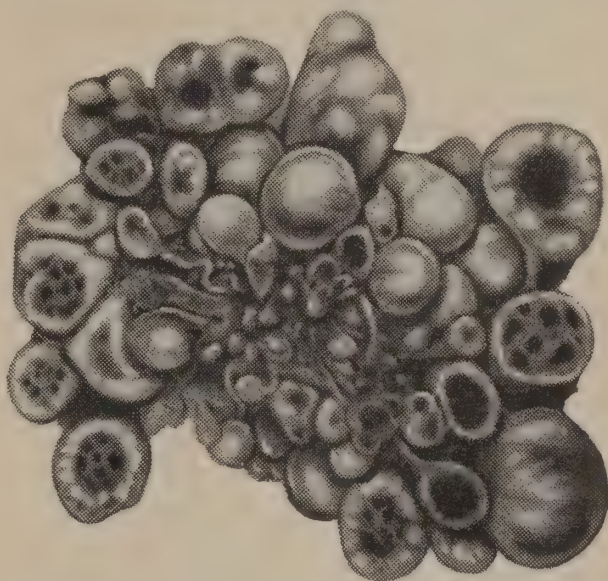
Symptoms. These will appear generally between the age of 4 and 7 months. The first indication observed is usually the dark combs on some birds and general lack of activity in the flock. Deaths are rather sudden, for individual birds, but continue over three or four weeks. The breast muscles may be pink or show patches of "fish-flesh". Internally the pancreas may be chalky or spotted; instead of a normal very pale pink. The kidneys may be enlarged. There is some evidence that nephritis (inflammation of the kidneys) is a basic disturbance in the disease. Pin point white spots may appear on the liver.

From this description it is apparent that Pullet Disease can be confused with several other troubles. Flock history is important in diagnosis. It appears earlier and less suddenly than acute Cholera. It can appear at about the same time as the chief losses from the Leukosis Complex, but losses extend over a shorter period of time with Pullet Disease. It also results in some general flock depression, while with Leukosis most of the flock will be in good shape.

Treatment. Once a fairly accurate diagnosis is made, a diet high in carbohydrates and low in proteins is indicated. This can be achieved by reducing the mash and increasing the grain. Molasses in fairly large quantities can be given in the mash; grain, or drinking water for a couple of weeks. Up to 10% of the total ration can be used. Since dehydration occurs as an important symptom, plenty of clean drinking water should be easily accessible at all times. Following the same reasoning, shade should be provided in hot, dry weather.

PULLORUM DISEASE. This is an acute, highly contagious disease of chicks but in adult fowls the infection is usually localized in some internal organ where it remains dormant and produces no external symptoms or disorder. The disease is very widespread throughout the country. Occasionally outbreaks of an acute type are reported in adult birds but this is by no means common, however, it frequently causes fatal disease in individual birds. (For the disease in chicks see Page 14.)

The infection in adult birds may be localized in the ovary, oviduct, heart or heart sac in females. The ovary is the



*Diseased ovary of Pullorum Pullet.
Many ovules are badly infected.*



*Normal ovary for comparison. Note
the round, healthy ovules.*

organ most commonly found infected. The diseased ovules or yolks are often irregular in shape and filled with a thick yellow or greenish colored oily liquid and some of the yolks may be tinged with blood. In males the testes and heart are the organs most frequently infected. Pullorum disease decreases egg production, fertility and hatchability.

Control. Most breeding birds are now being tested for pullorum disease. Much credit is due the hatchery industry for their splendid work in reducing this dreaded chick disease. The blood test is not perfect; that is, it will not always detect all of the infected birds in the flock at any one test. For this reason many hatcherymen test the breeding birds two or three times, at least, a month apart. The first test should be made after the flock has reached at least 25 percent production, and the last test should be made shortly before eggs are saved for hatching.

The agglutination test is the only method of detecting Pullorum Disease in the live birds and as stated above it has its limitations. The test is simple to perform but the success of the undertaking depends upon a high degree of accuracy of the operator to detect positive reactions which indicate the disease. Success also requires that repeated tests should be made on all birds of the breeding flock and the prompt removal of all reactors from the premises; that the house and equipment be given a thorough cleaning and disinfection after each test; that tested birds be separated from any contact with untested birds. Complete eradication of Pullorum Disease from the flock usually requires several years of testing. In establishing a clean breeding flock it is also necessary to be extremely careful in the brooding of chicks that are to become breeders. The chicks should be placed in a brooder that has been carefully cleaned and disinfected before the chicks arrive, and kept in a good sanitary condition. It is a good practice and a cheap insurance against the spread of Pullorum Disease to daily inspect the chicks, removing those that are weak or sick. Many germs do get into the drinking water even under the best conditions so it is well

to use a good water disinfectant such as Germozone. These chicks should be well separated from other fowls that may be carriers of disease.

= **The Blood Test.** Hatcherymen and breeders are well acquainted with methods of blood testing. The following description is given for the benefit of poultry raisers who confine themselves to egg and meat production. Blood testing is important to the entire poultry industry.

The test fluid is a purple colored solution containing *dead pullorum germs* and is called Antigen. The test is made on a glass plate ruled in 1½ inch squares. The plate is placed over a white background or used as a cover of a box containing a light. A drop of the antigen is first placed on the glass and a wire loopful of blood from the bird to be tested is obtained by pricking the comb or wing vein. This drop of blood is mixed immediately with the drop of Antigen. Adding the fresh blood to the Antigen prevents clotting; if the blood is placed on the plate first it may clot before the Antigen is added. The temperature of the plate should be kept at about room temperature 75 to 85°F. A clumping of the germs which will be seen as purple clumps about the size of the point of a pencil is termed a *reaction*. A reaction is positive proof the bird is infected or a disease carrier and should be promptly removed from the flock. The reaction is usually complete in a few seconds to three minutes. The birds may be held in a coop until the test is completed, and retained for the market if the reaction is positive.

ROUP (OCULAR). Ocular Roup in most cases follows a neglected Cold. The general view is that it is caused by a virus, but in the average case several different kinds of germs are also present including pus producing germs. Whatever the cause of the Cold may be, the irritation of the nasal membranes makes it easy for different kinds of germs to get a start. Therefore we find a mixed infection.

In this common kind of Roup there is often a bad smelling, thick discharge from the head. The feathers under the wings may be found matted from the nasal dis-

charge. If the disease is not stopped, that discharge backs up into the sinuses and causes the eyes to become swollen and even to bulge out. This condition is called Ocular Roup. Sometimes there are soft cankers in the mouth or throat.

For treatment of Ocular Roup. Follow the directions for treating Colds. See page 36. Because the infection usually is pretty far advanced and deep seated, it is advisable to use both Leemulsion and Vapo-Spray. Keep the birds, including the well ones, as comfortable and dry as possible. And since the disease is very contagious, of course the sick birds should be kept away from the others and you should do what you can not to let the disease spread. It is important to keep up the resistance of the well birds by the best of care. Add Tonax to all mash.

Wash the head out with an antiseptic Germozone solution. For this, use the Lee Poultry Nasal Syringe if you have one. This is especially important if the eyes have begun to swell, and also to help prevent such swelling. If you do not have a Lee Poultry Nasal Syringe, dip the head of the fowl into a Germozone solution and massage the mouth and head gently. A bird with chronic Roup should be killed because it is a danger to other birds.



A typical case of Scaly Leg.

SCALY LEG. This condition is caused by a small mite which burrows under the scales of the legs. This is a different kind of mite from the common Red Mite. The irritation caused by the mites causes the scales to turn out, and gives the legs a scabby appearance. Where Lee's Mite Killer is used regularly on the roosts this trouble seldom occurs.

Treatment. Dip the affected parts of the legs in a solution of one part of Lee's Mite Killer to one part of motor oil. Do this in the morning so that it will drain off before night. Spray the roosts, dropping boards and other parts of the poultry house liberally with Lee's Mite Killer as directed on the can.

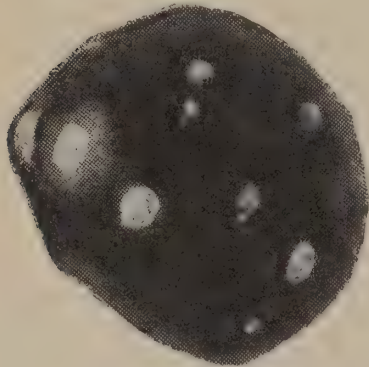
SOFT SHELLED EGGS. Occasionally some birds in a flock lay soft shelled eggs. In some instances no shell at all can be found. This trouble is more likely to happen in a flock of young pullets just coming into lay, but sometimes it occurs in older flocks toward the end of the laying season.

Several things may cause soft shelled eggs. Probably the most common one is a lack either of enough calcium (lime) in the diet, or of enough Vitamin D for the bird to make use of the calcium. Oyster shells are commonly fed to supply calcium; limestone, or any form of slacked lime can be used. Ample sunshine is rich in furnishing the necessary Vitamin D, but where this is not available Cod Liver Oil can be used. Nearly all commercial feeds contain 1% of Cod Liver Oil and that is as much as is ordinarily required, but this amount is sometimes not enough. Then it is advisable to increase the Cod Liver Oil content by another 2% for a while. Very often the trouble will clear up to a great extent without anything being done about it. For this reason a drastic change in the feeding system is seldom advisable, and may do more harm than good. Any known faults in the ration should be corrected.

There are other causes of soft shelled eggs in the case of an occasional bird, such as an abnormal condition of the oviduct (egg tube) or an improper functioning of the glands which secrete the shell-forming

substance. But nothing can be done for such a case.

TUBERCULOSIS. In some parts of the Country, Tuberculosis is still a serious problem. It is a disease of adult fowls, and seldom affects birds under one year of age. Hogs can get Tuberculosis from chickens, but people cannot.



*Tubercular
Spleen.
Similar spots
can generally
be found on
the liver.*

Symptoms. In the early stages of Tuberculosis there are no outward symptoms. But later, a lameness in one or both legs generally appears. The bird loses weight very rapidly, and poultrymen often say that the bird is going light. The comb generally remains a good, red color, and the appetite is usually good until the last.

Postmortem. Tuberculosis in chickens seldom affects the lungs. Cheesy spots, or lumps are found on the liver, spleen, or possibly on the intestines. The spots are always raised above the surface. Such spots on the spleen are the surest sign of Tuberculosis. If they are found there, it is always safe to diagnose the trouble as Tuberculosis.

Prevention. There is no cure for Tuberculosis. Kill and burn the affected birds. Clean up the premises and disinfect thoroughly. See Lee's Creosote Dip, page 79. The Tuberculin test can be used to pick out any birds that have the disease, but the test should be made only by a Veterinarian.

If Tuberculosis gets started, it is advisable to sell one's entire flock at the end of each laying year and to start with young chicks each year, for four years. In this way one can get good egg production during the Winter months, and never have birds more than a year of age. If such a

plan is followed for four years, the infection usually dies out, and it should be reasonably safe after that to hold good layers over as may be desired.

TYPHOID. This is an infectious disease caused by a specific germ. Typhoid germs get into the blood by way of the intestines. They multiply in the blood and affect the blood and most of the internal organs, especially the liver, spleen, and intestines. Usually Typhoid is found where conditions are unsanitary, but it can be carried from one poultry yard to another on the feet of animals or on people's shoes. Poorly drained soil is a likely place for the development of Typhoid germs, and if birds drink stagnant water there is danger that they may come down with the disease.

Symptoms. There is a loss of appetite, together with dullness, and increased thirst. The comb and wattles turn pale, except in the very acute cases, and then they turn dark. The droppings are soft and yellowish or greenish. In acute Typhoid the birds may die quite suddenly, much as birds with acute Cholera often do. But usually in case of Typhoid the birds will linger for several days to a week or more before they die.

Postmortem. The liver is considerably enlarged and in most cases has a dark greenish appearance. In some cases it may be a mahogany color. It is usually soft, and will break down easily when rubbed between the thumb and finger. The spleen is swollen and is a dark or purplish red. The internal organs, and especially the lining of the intestines, are generally very pale. The blood is usually of a lighter red than normal, and it does not clot so easily as normal blood.

Treatment. It is not practical to try to treat birds sick with Typhoid. They are passing large numbers of Typhoid germs in their droppings, so it is best to kill and burn the birds as they show sick. Good sanitation will do more to control Typhoid than any other thing. Move the well birds to clean quarters. If this is not possible, do all you can to clean the old quarters and to thoroughly disinfect them. Clean out and burn old droppings and litter.

Disinfect the buildings with one part Lee's Creosote Dip to 80 parts of water. Use two tablespoonfuls of Germozone to each gallon of drinking water. See that the birds do not get to any stagnant pools where they might drink. Fowl Typhoid bacterins have been used to some extent but even when they are used, results will be much more satisfactory if you follow these directions for sanitation.

WORMS. The common poultry worms are fully treated on pages 24 to 27. Worms in chickens over 6 months of age often cause greater loss than worms in younger birds. Besides causing loss of weight and hurting the general health of the birds, worms knock egg production. Very often they are the principal cause of poor egg production.

Both pullets and adult birds should be wormed with Gizzard Capsules before they are put in the laying house in the Fall. Even so, an occasional flock may be slow in coming into production or may not lay better than 35% or 40% regardless of worming and of good feed and care. Usually the reason for this is that the birds were so wormy that they could not be completely wormed with only one dose of any medicine that could be given safely. A worm medicine must not be so strong as to injure birds. Therefore it is sometimes advisable to worm a flock again, after it has been housed. Catching and handling birds to dose them, can cause a little drop in production for two or three days but getting rid of worms will make it possible for the birds to lay as they should.

Types of Organisms Causing Disease

In the preceding pages frequent mention is made of specific organisms for many diseases. A brief description of the nature of different kinds may be helpful to the poultryman, especially in deciding what he can do.

GERMS, MICROBES. These terms refer broadly to any microscopic organism but both are used very commonly as synonyms for Bacteria.

BACTERIA—One-celled plants, common wherever life exists. They are so small that an individual bacterium requires a rather powerful microscope to be seen.

Chicken diseases due to bacteria include Cholera, Colds (Coryza), Paratyphoid, Pullorum, Tuberculosis, and Typhoid. In Colds and Tuberculosis, certain organs or tissues are invaded. In the other diseases mentioned, a more general invasion of the body of the bird can take place, with chief damage due to poisons secreted. The fowl sometimes reacts sufficiently to localize damage, and we find such things as the swollen eye of Ocular Roup and diseased ovaries of a pullet with Pullorum. Bacterial diseases are often acute—there is a battle between the fowl and its enemy, and one or the other wins in short order.

VIRUSES—A virus is an organism too small to be seen with even a powerful microscope, but demonstrable by other means. For example, if Pox scabs are suspended in a suitable liquid and all bacteria filtered out, the extract will still cause the disease when scraped into the comb of a bird that has not had it.

Well recognized diseases of chickens due to a specific virus include Fowl Pox, Infectious Bronchitis, and Laryngotracheitis. Less completely understood are Leukosis and Newcastle Disease. Damage from the first three is related to attacks on specific tissues, but the net effect on general health may be severe—often enough to cause death.

PARASITES—These include the microscopic one-celled animals that cause Coccidiosis and Trichomoniasis in chickens, as well as the larger many celled intestinal worms and the external lice and mites. The distinction between the general effect of a parasitic disease and trouble from bacteria is sometimes hard to make. From a practical standpoint it is well to keep in mind that parasites cause trouble only when present in large numbers.

Poultry Feeding and Nutrition

By far the largest economic factor in poultry raising is the cost of feed. A flock of 100 laying hens will require over 4 tons of feed in a year. Much of this will be in the form of special poultry mashes. It pays the poultryman to understand feeds and feeding to the extent necessary to spend his dollars wisely.

METHODS. Many systems of feeding have been used successfully. However, the food factors required are the same in all good methods. Common types are: 1. All-Mash (or Pellets). This is a popular way of feeding broilers, and can be extended to cover laying and breeding flocks. 2. Mash (or Pellets) and Scratch Grain. This is probably the commonest of all systems. It is fairly flexible, keeps up appetite, and allows the use of the home grain supply. 3. Concentrate Mashes. If you have plenty of grain and facilities for grinding it, consult your feed dealer about a Concentrate for making a complete mash. 4. Cafeteria Feeding. A suitable Concentrate obtained from your feed dealer is used. But it is fed in a separate hopper instead of mixed with grains, which are also fed in separate hoppers. Popular in some sections, its advocates claim extreme flexibility along with simple utilization of home grains.

HINTS ON ECONOMY. Cheap feed and inadequate rations cost money rather than save it. However, some ways are open to practice wise economy. Pasturage and green crops form an important supplement during parts of the year. Skimmilk may be profitably fed, especially to growing chicks. Even table scraps should not be neglected for small flocks. Culling increases flock health, and reduces the feed bill. In the same way, disposing of cockerels as soon as marketable will save money. Actual waste of poultry feed occurs largely from two sources, poor feeding

equipment and rat infestation. Good feeders, designed to prevent spilling, will pay for themselves in a year. Many feeders, otherwise satisfactory, must not be filled beyond a certain level for best results.

NUTRITION. The astounding growth of the American poultry industry is based to a great extent on scientific poultry nutrition. The work done in this field has been vast and complicated. Although no one can comprehend all of it, certain basic facts stand out for all to use.

For years we have been familiar with Proteins, Fats, and Carbohydrates. Proteins form the muscular framework of higher animals and birds. New facts about Amino Acids, the building blocks of Proteins, are discussed below. Fats can be used for energy, and are a means of storing energy. Actually, their function and chemistry extends far beyond this. Of major interest to the poultryman are the fat soluble Vitamin A and Vitamin D₃. Carbohydrates (starches and sugars) make up over half by weight of all feed used. They are the Nitrogen Free Extract (N.F.E.) on feed tags. Nature provides them so abundantly that we pay little attention to them.

Amino Acids. These are to Proteins as letters are to words. Just as we make thousands of words from the twenty-six letters of the alphabet, so the animal body builds up many Proteins by joining together about twenty Amino Acids. Their discovery is not something new; the presence of them in animal and plant tissue has been known for a hundred years. Recent progress has centered around of fuller knowledge of them, and the identification of which ones are "essential". An essential Amino Acid is one that cannot be made by the animal, is necessary in building tissue, and hence must be supplied in the feed.

It is well to know that Amino Acids in

pure form are much too expensive to use in the feed. Let us take a specific example. Lysine has long been known as an essential Amino Acid. It is required to the extent of 1% in the ration, but is so hard to purify that it costs \$1,000 a pound. Your feed must contain one pound to each 100 pounds. The problem is not hard, because meat scraps and dried milk are rich in Lysine. Now during the war animal proteins were scarce and had to be limited. The chemist had found that the protein of Soy Beans is rich in Lysine. The nutritionist had tested practical rations based on such knowledge. As a result of this, and other discoveries just as important, the poultry industry was able to reach phenomenal heights of production.

VITAMINS. A Vitamin is an organic substance required for the life process in extremely small quantities. Some Vitamins, like Niacin, are very simple chemicals. Others are quite complex. Chickens require a large number of different Vitamins, but fortunately Nature supplies most of them abundantly in the normal poultry ration. Only those requiring special attention are discussed here. As a general rule symptoms of vitamin deficiency are more often found in rapidly growing birds or in laying flocks on high production. Vitamins are "growth factors" and the producing of an egg is an important form of growth; every necessary element must be supplied.

Vitamin A is essential to growth, and required throughout life for general health. It has a special function in keeping the lining of the upper respiratory tract in good condition. This tissue includes that around the eye and nasal passages. Acute Vitamin A deficiency in chicks can cause a nasal discharge and sticky eyelids. In older birds lack of Vitamin A results in "Nutritional Roup". This is similar in appearance to Ocular Roup, but has no bad odor.

Vitamin A is found in Cod liver oil and other fish oils, and in choice green feeds such as alfalfa, lawn clippings, succulent pasture carrots, sweet potatoes and yellow corn, also in dehydrated alfalfa leaf meal.

When yellow corn is used in the mash the amount of alfalfa meal may be reduced. When good pasture is available it will take care of the Vitamin A requirements. Turkeys require twice as much as chickens.

Vitamin D3. Lack of Vitamin D3 in chicks results in Rickets. In older birds only extremely low levels affect health, but high levels are required for egg production. Lack of D3 results in soft shelled eggs, low production, and low hatchability. Laying flocks require Vitamin D3 added to the feed during winter months. Turkeys require at least twice as much as chickens.

Riboflavin (Vitamin G). Extreme deficiency results in "Curly Toe Paralysis" in chicks. However, the importance of Riboflavin as a growth factor far overshadows any other consideration. It was long known that chicks thrived on rations containing milk in any form. The fact that the Riboflavin in milk is the chief reason was a timely discovery early in World War II. By that time not only was the Riboflavin content of most feeds known, but the chemical itself was in commercial production. The poultry raiser was not dependent on costly skim milk in Starting Mash. At the present time commercial mashes and concentrates are well fortified with Riboflavin.

TRACE MINERALS. Men, animals and birds have always gone direct to the earth for part of their food. Trace Minerals may function as essential growth factors (Manganese), be required for a specific vital function (Iron as an Oxygen carrier in the blood); or behave similar to Vitamins (Copper in helping to form Hemoglobin in the blood). There is a growing belief that trace minerals perform necessary and complicated functions in most life processes. Those known to be essential for animals include Iodine, Cobalt, and Zinc.

A correct balance of both bulk and trace minerals is necessary. Requirements and limits are fairly well established, but not enough is known about normal occurrence in poultry feeds. The trace minerals in Tonax are balanced in the light of present knowledge. The amounts used are well below any harmful level.

YOUR LEE DEALER

Can Help You with Your Poultry Problems

Lee Remedies are sold only by Lee Dealers. They are druggists, feed dealers, hatcherymen and other established merchants. We sell to users direct from our factory only in communities where there happens to be no Lee Dealer, or if the Lee Dealer happens not to carry the particular Lee Remedy which the poultry raiser needs.

We do not employ any peddlers or canvassers. Our representatives do not call on a poultry raiser except at his Lee Dealer's request and then only with the Lee Dealer, to give his customer help regarding the care and management of his flock.

The Geo. H. Lee Company is very particular in the selection of its Dealers. The Lee Dealer may not have the largest store, but he does have a good store. We make an effort to select the very best dealer we can get at each point. He must be a responsible business man, dependable and reliable in his business dealings.

Your Lee Dealer is a citizen and a taxpayer who is helping to build up your community. It is likely that he is your personal friend as well as business acquaintance. He is not "here today and gone tomorrow." He will be doing business in your town next week and next month and next year, and he will stand behind everything he sells you, especially Lee Remedies.

How much better it is to buy your poultry remedies from him rather than from some peddler who will try to load you up

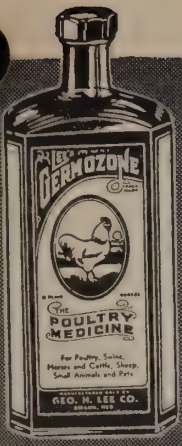
with as big a purchase of unknown remedies as he can and then never see you again. Why put your trust in a peddler whom you do not know and who expects to make only one sale to you?

Your Lee Dealer is not so much interested in the profit from one sale to you. He wants to help you so that you will be a regular customer, for Lee Remedies and other things, for years to come.

When a medicine is needed, it is often needed immediately. Your Lee Dealer performs a real service for you by keeping an assortment of Lee Remedies on hand at all times for you.

You will want to keep Germozone on hand for giving regularly to your birds, and it is good for you to have either Lee-mulsion or Vapo-Spray for immediate use at the first sign of a Cold or gasping. But it would be impractical for you to try to keep all of the Lee Products on hand. Your Lee Dealer does that for you. You can get them from him without having to send to the Lee Company, and with no delay.

Ask for Lee Remedies only at the store of your Lee Dealer. If you ask for a Lee Remedy at some other store, naturally the merchant will try to sell you something else claimed to be "just as good." Learn who your Lee Dealer is, then depend on him, call on him for help in all poultry troubles. And purchase from him your Lee Poultry Remedies and all other things you can.



Give all your Birds

GERMOZONE

The Liquid Drinking Water Medicine

All birds are bound to get many germs on their beaks as they pick in litter or on the ground. Then those germs get washed off into the drinking water. In that way many of the germs that are passed out by one infected bird get *inside* the rest of the flock. And the same is true of germs carried into the poultry yard by the wind, or on people's shoes, or on the feet of animals. All of your chicks need reasonable protection against poultry diseases that are often spread through the drinking water. Germozone is given in the drink. It destroys many of the germs and bacteria in the drinking water.

The value of such protection is supported by many years of use by thousands of poultry raisers. Germicidal power can be measured in the laboratory, but medicinal benefit can be judged only by use under conditions that prevail in practical poultry raising.

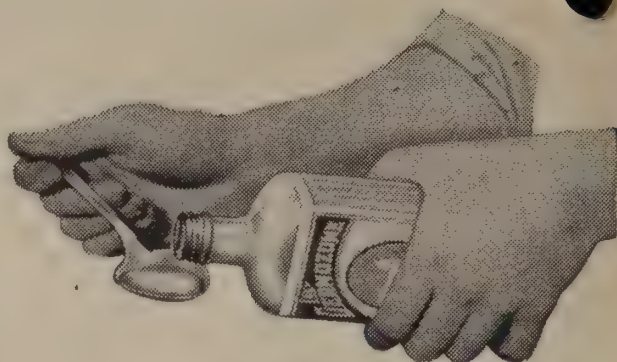


How to Use GERMOZONE effectively FOR BABY CHICKS

Chicks should be given Germozone in all drinking water for the first three weeks, one tablespoonful per gallon (one teaspoonful per quart). After that, as long as the chicks are well, it can be used in the same proportion two or three days a week, or every other day if preferred. After the chicks are six weeks old, two tablespoonfuls per gallon of drinking water should be used.

As Chicks become strong enough to scratch vigorously in the litter, raise the drinking fountains a little off the floor level to avoid rapid contamination of the water. Move the drinking vessels from day to day to avoid wet spots favorable to bacterial growth.

Protection of the drinking water will help avoid many troubles that cause loss during the brooding period. Other good general sanitation is also necessary. One of the most important factors is the prevention of contact with older chicks or even mature birds. A poultryman who broods several lots of chicks in the course of a season will often notice that the task of keeping them healthy grows harder with each lot. Where this practice is necessary, rigid disinfection of brooder house is necessary between each lot. It will also help for the caretaker to handle all chickens on the premises in increasing order of age. Do not go directly from 6 week old chicks to baby chicks, or from the laying house to the brooder house. Work upward from the youngest stock you have.

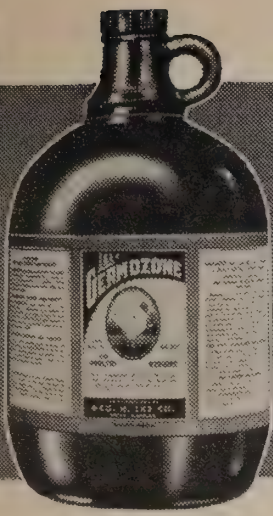


A LIQUID

Another good thing about Germozone is that it is a liquid. Most poultry raisers who have ever tried poultry drinking water tablets, have noticed how it takes time to get them dissolved and then to get the antiseptic evenly mixed all through the water. If one does not have the patience or time to wait for the tablet to dissolve, there may be too much of the antiseptic in one part of the fountain and almost plain water in another part. Just a swish with the spoon, or turning your fountain upright, is enough to make Germozone mix evenly through the water so that each bird gets just the right concentration.

You can easily see the effect of this even mixing with Germozone on account of the strong color of dilute solutions. Perfect uniformity of color means perfect distribution in the water. In clean glass gravity fountains the purple color can be seen for hours. The same results are obtained by the use of clean galvanized fountains.



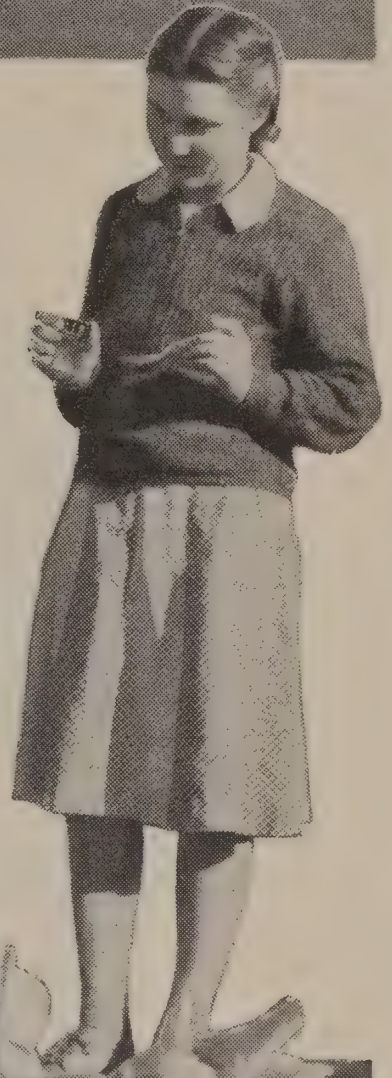


GERMOZONE

for Growing Birds

After chicks are carried through the critical brooding period successfully, they are introduced into larger quarters or placed on range. Bacterial troubles are not the problem in growing birds that they are with chicks and mature birds. However, not all danger of bacterial infection is over. A specific case where precautions are necessary would be where the growing chicks have even occasional contact with older stock. At this time also, your flock may get into decaying organic material or drink from contaminated puddles.

Have Germozone on hand and use it at the rate of two tablespoonfuls per gallon when necessary. Use it one tablespoonful per quart in washing out the crops of any birds showing symptoms of Botulism (see page 31). The parasitic troubles cause most loss in growing stock, and these are discussed thoroughly on pages 19 to 27. Glance over these, giving special attention to Coccidiosis and Worms.





GERMOZONE

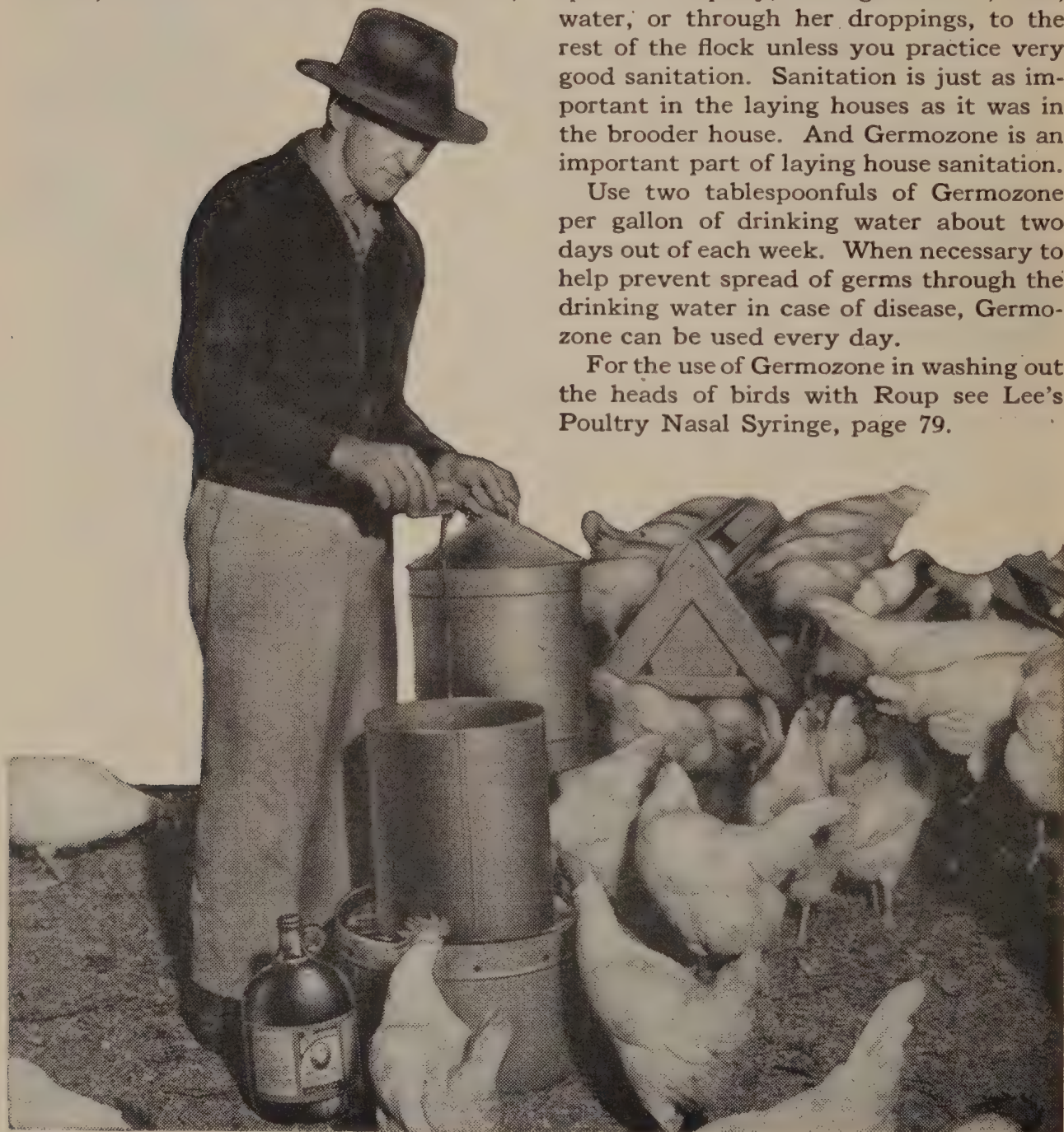
for Layers

When your birds are put in the laying house, they are thrown again into very close contact. They eat from the same feeders, drink from the same fountains,

breathe the same air, and pick in litter containing one another's droppings. If one bird gets any disease, she is likely to spread it rapidly, through the air, feed, water, or through her droppings, to the rest of the flock unless you practice very good sanitation. Sanitation is just as important in the laying houses as it was in the brooder house. And Germozone is an important part of laying house sanitation.

Use two tablespoonfuls of Germozone per gallon of drinking water about two days out of each week. When necessary to help prevent spread of germs through the drinking water in case of disease, Germozone can be used every day.

For the use of Germozone in washing out the heads of birds with Roup see Lee's Poultry Nasal Syringe, page 79.



GERMOZONE for Livestock

Germozone has so many uses on the farm that many farmers would not think of being without it. Some of Germozone's most enthusiastic boosters are farmers and stockmen who use it not only for poultry but for calves, lambs, and pigs. Such animals are often subject to a number of minor digestive upsets which Germozone may help.

FOR CALVES. Use one tablespoonful added to one-half gallon of warm milk. Give morning and night.

FOR LAMBS. Two tablespoonfuls of

Germozone to each gallon of all drinking water used during the period of treatment.

FOR PIGS. Use two tablespoonfuls of Germozone to each gallon of clean drinking water. Since pigs will often develop bowel trouble because of poor sanitation, special attention should be given to this factor. Pigs are often helped by a laxative, and one ounce of epsom salt per quart of drinking water for each 100 pounds of live weight can be used. Give this in clean water the first thing in the morning before other water or food has been given.



GERMOZONE for Poults

FOR BABY POULTS. The most critical time in the life of a turkey is during the brooder age. Pullorum disease, Paratyphoid, Fowl Typhoid and other troubles

causing bowel disorders are the cause of the greatest losses during this period. Great care should be taken to keep feeders and water fountains clean. The water fountains should be washed at least once a day. The litter should be kept dry and as clean as possible. This will be a great help in avoiding many disease germs. But regardless of all this cleaning some germs will get into the drinking water. Therefore a good water disinfectant should be used. Germozone is harmless to the poults but is efficient in killing these disease germs in the drinking water.

Poults should be given Germozone in all drinking water for the first six weeks, one tablespoonful per gallon (one teaspoonful per quart).

FOR GROWING POULTS. The diseases so common to baby poults are very often found to extend into the growing period. The danger from these diseases in chicks is usually over at about three weeks of age but this is not true for poults. There-

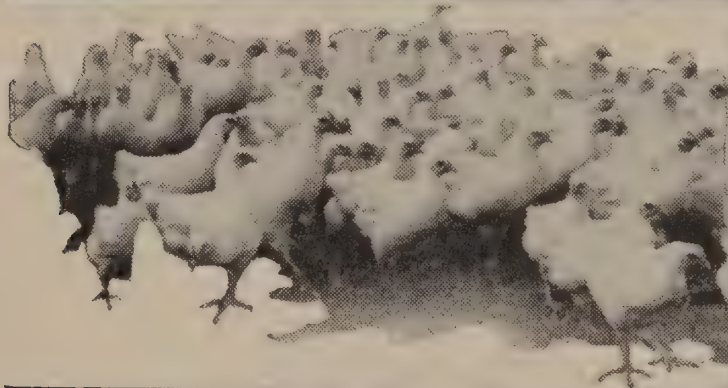
fore, great care in maintaining good sanitation must be continued as long as the poults are in the brooder house. The use of a good drinking water disinfectant is a part of good sanitation.

Growing poults after six weeks of age should be given Germozone in all drinking water at the rate of two tablespoonfuls to each gallon of water.



SAVE MONEY

By Getting Enough GERMOZONE for your Flock Requirements



There are sound economic reasons why you can save money by selecting the larger sizes of most medicines. This is true for Germozone. A quart is more than twice as economical, ounce for ounce, as a small four ounce bottle. And the larger sizes are even more econom-

ical. It is to your advantage when you get your chicks, to buy as much Germozone as they will probably need. We suggest a *quart* for *each 100 chicks*. This will carry them well through the growing period in most cases. The rule will hold in buying Germozone for older birds—one quart for each 100 unless there is trouble and you plan to give all of them Germozone every day for quite a while. Always buy in the largest, most economical size, you can.

**GERMOZONE Comes In
Five Handy Sizes**



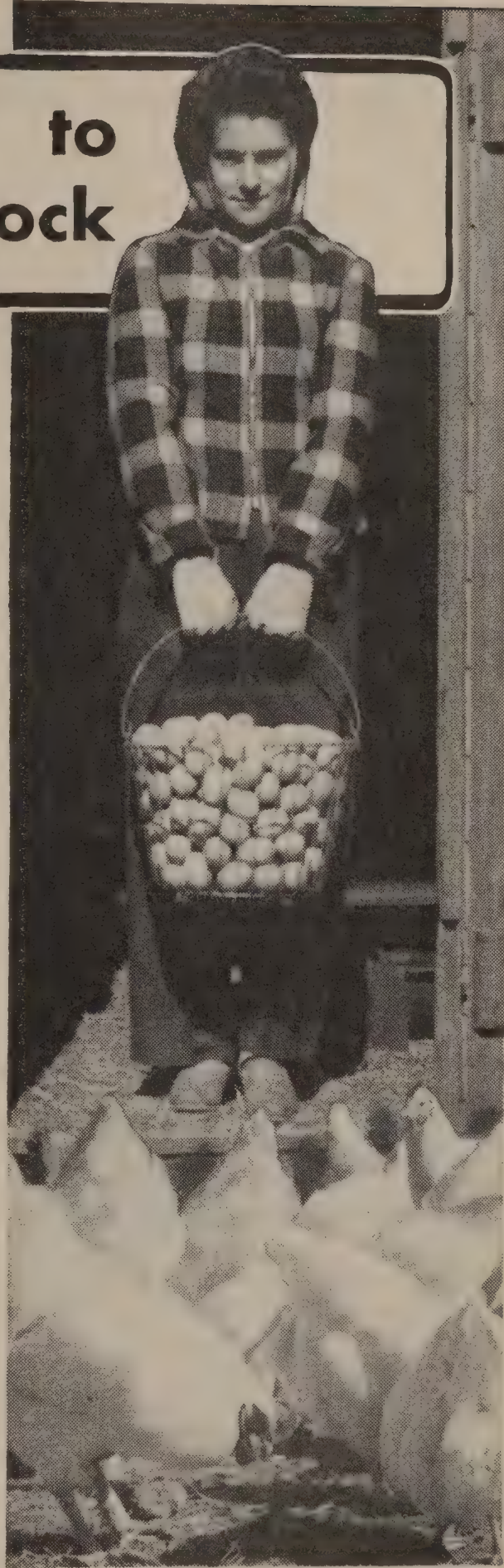
Why it Pays to Worm your Flock

Worms not only cut down egg production, but they often hurt general health. They may lead to most any disease. Worms are even more harmful to growing birds than they are to laying birds. They cause the same damage to the intestines and rob the growing birds of feed, too. No chickens, young or old, are ever very profitable when they are filled with worms. Most flocks, unless wormed, have at least some worms.

Worm infestation can easily grow worse unless steps are taken to control it. As you fight worms from year to year, your problem becomes easier. When you worm your layers this year, you are starting the program of helping the chicks you will raise next year.

Large Round Worms, Pin Worms, and Large Tapeworms are common intestinal worms throughout the United States. In certain restricted localities other poultry worms may be found. Sanitation to prevent loss from Large Round Worms and Pin Worms will do also for other worms with a direct life cycle. Some other uncommon worms are like tapeworms—they must go through an insect or snail in the first stage of development (indirect life cycle). Control of these often centers around removing the flock from contact with the insects or snails that carry the parasitic worms.

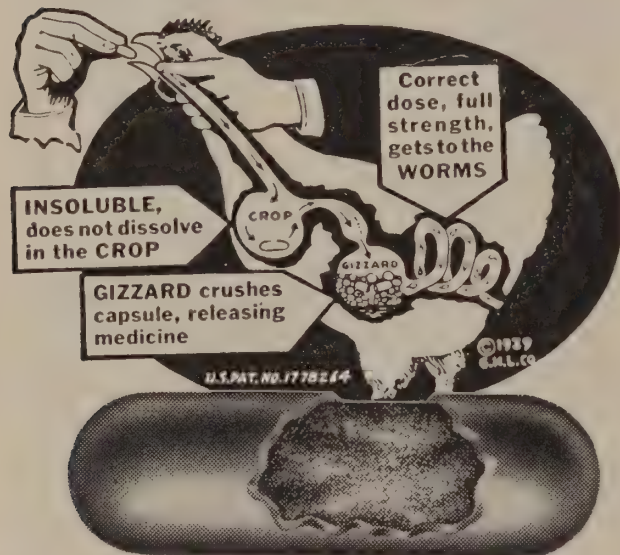
Follow this program through at the proper age with medicinal helps that will often do much for your flock. See Gizzard Capsules (pages 60–61) and Lee's Flock Wormer (pages 62–63).





"GIZZARD CAPSULES Mean Measured Dosage for EACH BIRD"

Individual treatment is the only sure way in worming chickens to see that each bird gets a measured dose of medicine. Birds do not eat at the same rate or the same amount. Wormers used in the mash are useful at times, but each pullet to be kept over for laying should be given the advantage of an accurately measured dose of worm medicine. She gets this when you use Gizzard Capsules.



The Insoluble Coating has always been a feature of Gizzard Capsules. In fact, it inspired their very name. The diagram above illustrates in a simple manner how the Insoluble Coating works.

Through years of constant experiment and research we have learned how to combine drugs that do their work effectively and **WITHOUT KNOCKING EGG PRODUCTION**. Pullet flocks just starting to lay are sensitive to handling. Treat such

birds with Gizzard Capsules before they come into lay.

The Gizzard Capsule works quickly and the drugs are rapidly eliminated. To get this "flash action" give Gizzard Capsules on an empty crop.

WHEN TO WORM

There are times when it may be necessary to worm young birds less than 3 months of age. The Chick Size Gizzard Capsules are usually safe for even 8-week old birds, but it is best to try them on only a few at first, to see how the chicks stand treatment.

No poultry owner can afford to feed worms. It is always advisable to use Gizzard Capsules whenever worms are suspected. But worms often cause severe damage before they are noticed. Most poultrymen follow a systematic worm control program. Pullets are treated with Pullet Size Gizzard Capsules at 4 months of age, and with Adult Size Gizzard Capsules between 5 and 6 months of age. Hens kept over can be treated at the second worming and again in the late Spring.

How to WORM



For best results Gizzard Capsules should be given when the crop is empty. Treatment can be given the first thing in the morning when the birds have been without feed since the evening before. This is the best time for birds on range. For birds confined in limited yard space, feed can be taken away about three o'clock in the

afternoon, and treatment given shortly after dark.

You will find that it is easy to give Gizzard Capsules. Open the beak with the left hand, and slip the capsule along the roof of the mouth with the right. Push it back in the throat with the little finger, and just set the bird gently on the ground.



Lee's FLOCK WORMER

A New Convenient Aid To
Your Worm Control Program

EASY ONE DAY TREATMENT

For the Control of Large Round Worms and Cecal (Pin) Worms in Chickens and Turkeys

Increasing labor costs have forced many poultry raisers to look for a satisfactory worm control program based on medication of the feed. To satisfy this demand we offer Lee's Flock Wormer for use in the mash. In formulating it every consideration was given to the special properties necessary to make this type of worm treatment effective.

MEDICINES

Since the use of worm medication in the mash involves the simultaneous consumption of feed, only drugs that do their work

with food in the crop can be considered. It has long been known that Nicotine at a dosage of a grain or a little less per adult bird is quite effective in the expulsion of large round worms. The action of Nicotine against this particular parasite is almost as powerful with food in the crop as when the crop is empty.

Phenothiazine has proved itself an acceptable companion to Nicotine. It does its work even better when used with feed. This is probably due to a change it undergoes in the body during the course of normal digestion. This change is shown by pink droppings that are often noticed when the drug is given. This pink color is quite harmless and not connected with blood in any way. Phenothiazine can be regarded as the new discovery that made an efficient flock wormer possible. It is by itself at proper dosage a reliable cecal worm treatment, and it aids the action of Nicotine against large round worms. An added help is the fact that birds in good condition, except for worms, tolerate Phenothiazine remarkably well.

Lee's Flock Wormer has a laxative effect and no added flushing is necessary.

DOSAGE

The actual amounts of Nicotine and Phenothiazine required to expel worms are well recognized by poultry parasitologists. The difficulty lies in getting the



birds to consume the necessary amount in a given time period. For economy in labor and medicines, this period is conveniently six to eight hours. Lee's Flock Wormer has been made as palatable as possible to insure consumption of treated mash. The poultry raiser should do two things to get the most benefit from his efforts. The first is quite simple—get a thorough mix of Lee's Flock Wormer with the mash in which it is used. The second is not hard but may require some forethought—take all feed away from the birds the evening before so that they will be hungry when the treated mash is offered. Covering mash hoppers or removing them is often possible. Otherwise the mash itself should be taken out of the hoppers. This job will not have to be so thorough if done about three o'clock in the afternoon. Scratch grain in litter or on range should not be available the morning of treatment.

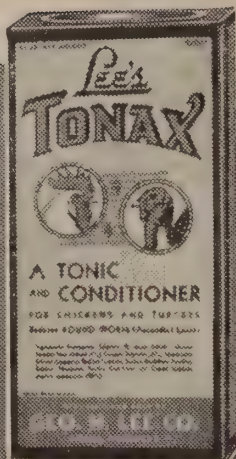
If these precautions are taken, most of the birds will get an effective dose of medicine. No flock treatment can be made as reliable as individual administration of Gizzard Capsules. Birds off feed will escape treatment, but these are often culls that should be removed from the flock.

WHEN TO USE

Under modern brooding practice chicks and poults do not come in contact with worm eggs until allowed out on range. If

placed on range at six weeks, any worm eggs picked up will require three weeks for development. Hence it is seldom necessary to give Lee's Flock Wormer before ten weeks of age, and three months of age is a good time to start medication. Due to the life cycle of round worms and cecal worms, treatment oftener than once a month is not economical. If worm infestation is known to be heavy, Lee's Flock Wormer can be used once a month during the growing period. If worms are not a serious problem, Lee's Flock Wormer can be given at intervals of six weeks or two months.





TONAX

for Growing Birds and Layers

A Tonic and Conditioner Used in the Mash

Tonax will supply your birds with blood-building elements and trace minerals that they need. It will give them reliable stimulants which will help them along during the critical period when they should build up a natural resistance to many diseases.

Appetizer

The "bitter tonics" have been used in medicine for years because they stimulate the appetite. Nux Vomica, which is one of the ingredients in Tonax, is the one most commonly depended on. It helps to make birds more active, to pep them up, and to improve their digestion.

Tonax makes the feed taste good to the birds. They like it. For that reason it is easier to change mashes when you have your birds on Tonax. They like the Tonax flavor and get used to it in one mash, and then it is possible to switch to a new Tonax mash without throwing them off feed.

For Growing Birds

Each drug in Tonax has been selected for a particular purpose. This combination of drugs in Tonax makes it ideal for year-round use. Broiler men report fine satisfaction after using Tonax. Poultry raisers tell of steady growth and weight maintenance.

For Laying Hens

A laying hen must convert food she eats into eggs. That is quite a drain on her system if she is a good producer. And only a good producer is profitable. Every bit of food must first be changed in the intestines so that it can be taken up by the blood. It is then carried through the blood stream to the different organs. A part of that food is used by the hen to keep up her system, but if she is a good layer the greater part of feed is used to manufacture the eggs. In other words, she must take the raw materials (which are her feed) and manufacture them into eggs. A hen therefore can be likened to a small, complicated machine. As in any other complicated machine, every working part of her body must be working perfectly. If any one part fails to work properly, the entire machine is hindered, or fails entirely.

Tonax is very helpful to laying flocks. It helps to keep the birds' systems working properly.

Tonax helps to stimulate intestinal activity and in that way helps the birds to handle their food. It furnishes important trace minerals which are so necessary to both health and egg production. The stimulants which are contained in Tonax are valuable in keeping the birds' systems toned up.

HOW TO USE TONAX

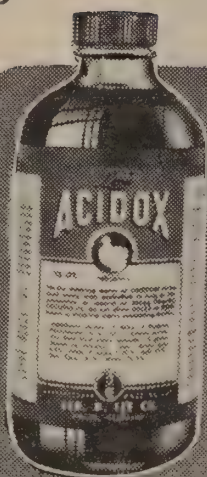
Tonax is easy to use. Just mix one pound of Tonax with 100 pounds of mash, as a tonic and conditioner. This proportion also serves well if started when chicks are 6 weeks old and fed regularly all through the growing period.

Another method of using Tonax is to mix two pounds with 100 pounds of mash, and feed this 2% mix for one week out of each month. This is very economical, and may fit into some programs conveniently.

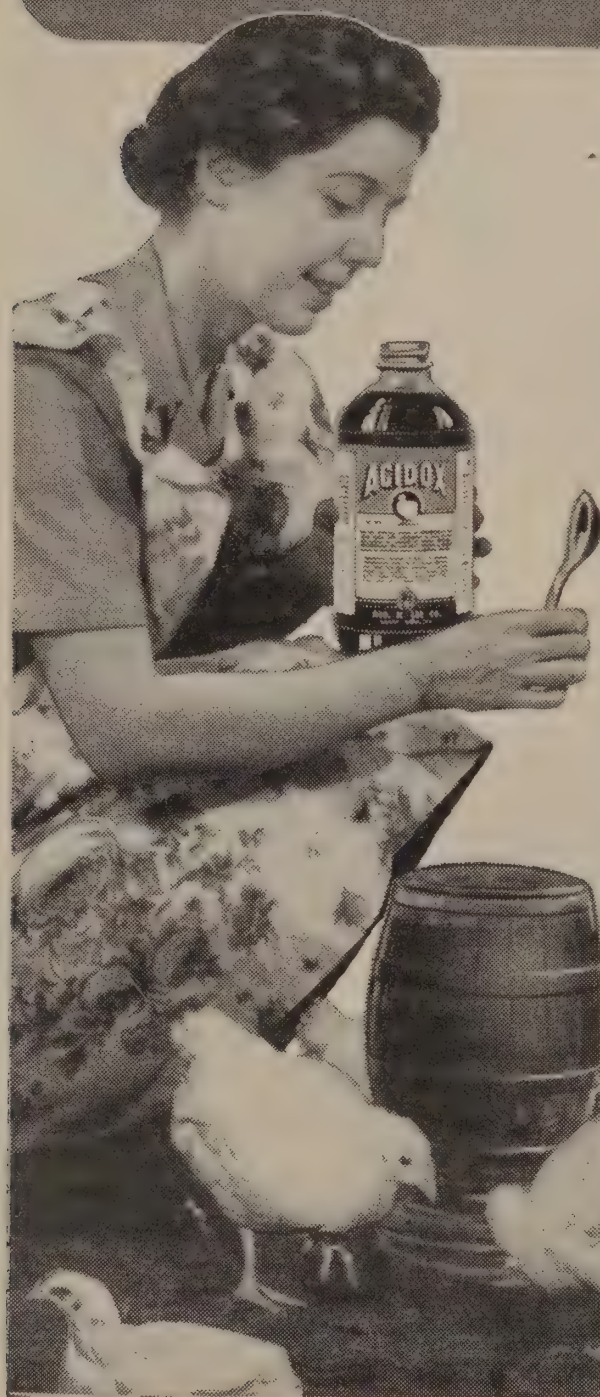


AMOUNT OF TONAX NEEDED

FOR GROWING BIRDS (7 to 18 weeks inclusive)			FOR ADULT BIRDS (per month)	
Size of Pkg. Required	1% Continuous Feeding	2% mix, 1 week per month	1% Continuous Feeding	2% mix 1 week per month
	<i>Enough for</i>	<i>Enough for</i>	<i>Enough for</i>	<i>Enough for</i>
12 oz.	10 birds	20 birds	24 layers	48 layers
2 lb.	26 birds	52 birds	60 layers	120 layers
6 lb.	75 birds	150 birds	180 layers	360 layers
25 lb.	300 birds	600 birds	750 layers	1500 layers
50 lb.	600 birds	1200 birds	1500 layers	3000 layers
100 lb.	1200 birds	2400 birds	3000 layers	6000 layers



Follow this Valuable Program for the Care of Flocks with **CECAL COCCIDIOSIS**



Coccidiosis Control PAYS

Coccidiosis is a disease caused by parasites. Therefore the losses can be greatly reduced by good management. The nature of the parasites that cause Coccidiosis and the methods for keeping them down by sanitation are discussed on pages 19-21.

Most poultry raisers now follow a pretty good system of reducing losses from Coccidiosis. That is, a system of reasonable, practicable sanitation for Coccidiosis control. The cost of controlling a disease comes right out of the flock owner's pocket in one way or another. The poultryman should want to know just how much that cost is. Fortunately, in the case of Coccidiosis control, you are able to make a pretty good estimate. You can figure very closely what the extra litter, labor and chemicals for your sanitary program cost.

THE 3 POINT PROGRAM

FOR CECAL COCCIDIOSIS

1. Effective Sanitation — For both Prevention of Coccidiosis and for the Care of Flocks with the disease. (See pages 19 to 21. Also under Litter Spray page 73).

2. Housing — Ample space for the comfort of the birds even during critical spells of wet weather. Plenty of clean, dry litter stirred every other day with a rake.

3. Acidox — In the drinking water every day for ten days after five weeks of age when indicated for prevention or when visible symptoms appear.

AMOUNT NEEDED

Acidox is very economical to use. The following estimates of the amount required are based on average water consumption during ten days of daily use.

Number of Birds	Number of Birds	Size Bottle Required
6 Weeks Old	10 Weeks Old	
50	25	4 oz.
150	75	12 oz.
400	200	1 quart
800	400	½ gallon
1600	800	1 gallon

You can afford to have this cost run between 5c and 10c per bird, because in most cases the extra weight gain will more than repay the money you spend. And the same control methods will keep down other troubles too.

COST OF MEDICINE

When it comes to the cost of the medicine, you should keep in mind that for the control of Coccidiosis no medicine, how-



ever expensive, can take the place of sanitation. Therefore the cost of the medicine must be added to the cost of the sanitation. Let us suppose for example that you have 200 growing birds. You can use a quart of Acidox on them for about 1c per bird, and that should be all the Acidox you will need for the season. Six birds saved, that might otherwise be lost, will easily pay for the Acidox.

FOLLOW DIRECTIONS

Powerful medication like Acidox should be used with care. Acidox becomes actively coccidiostatic at one tablespoonful per gallon of drinking water. Due to habits in measuring, this is a good standard to use. Do not exceed four teaspontuls per gallon in any case. Do not use any other medicine for Coccidiosis control at the same time.

ACIDOX AS A TONIC

When used at a dosage of ¼ ounce per gallon (a generous *teaspoonful* per gallon or two tablespoonfuls to five gallons of drinking water) Acidox will have a tonic effect on many flocks when given daily for three weeks. Do not exceed this dosage when using Acidox for this purpose, and do not use any other medicine containing an arsenical at the same time.



At the First Sign of Colds, Wheezing, Gasping

Stir LEEMULSION into drinking water . . .

Put LEEMULSION in the drinking water every day for three days. Use only a level tablespoonful to each gallon of water, and stir thoroughly. Leemulsion mixes with the water and helps to disinfect all of it—not just the top surface as many oils do. When birds drink, their beaks get coated with an oily film which helps to prevent infection. Part of the oil works

up into the air passages. Leemulsion soothes and reduces irritation—works much like a good cough medicine on humans.

LEEMULSION in the MASH

Acute respiratory distress is sometimes aggravated by a finely ground mash. In such cases a moist mash increases the relief you can give your birds, and Leemulsion is ideal for adding to such a mash. The choice of using Leemulsion in drinking water or mash will depend on circumstances. Directions for both methods, and also the very popular use of Leemulsion for pigs and hogs, will be found on every bottle. A full discussion about using Leemulsion for chicks is given on page 70.



... Spray **VAPO-SPRAY**

in Air over heads of Birds

Treat the Whole Flock with **VAPO-SPRAY**

Because of the highly contagious nature of most diseases of the air passages, treatment of individuals is of little use. The whole flock must be protected.

HOW TO USE

The first step to be taken is the prompt use of VAPO-SPRAY. Use a sprayer that gives a fine mist, and direct it over the heads of the fowls. Continue light spraying for about five minutes. The fowls should cough and shake their heads vigorously—that is part of the beneficial effect of the Vapo-Spray. At least three treatments should be given every day until the trouble clears up.

VAPO-SPRAY is a combination of healing oils and expectorants. Both its antiseptic and inhalant properties are valuable. It is sprayed in the air of the poultry house until a light mist is created. The beneficial oils are breathed by the fowls and volatile portions work gently through the air passages.

All forms of bronchitis should receive

immediate treatment with both Leemulsion and Vapo-Spray. Prompt action is urgent. Laryngotracheitis should be treated with Vapo-Spray and Leemulsion even if the fowls have been vaccinated.

OTHER PRECAUTIONS

A laxative may be helpful where a large part of the flock seems listless or shows outward symptoms. See page 40 for directions to be followed.

Dampness and drafts contribute to the development and spread of colds and bronchitis. Take measures to provide dry quarters and litter when necessary. Cross drafts can be eliminated best by having open windows on only one side of the poultry house.



How to use LEEMULSION for baby chicks



Diseases of the Air Passages in Chicks

BRONCHITIS in chicks is quite common. The chicks gasp for air, stretching the neck like the thumb-nail sketch at left. Bronchitis is caused by a specific virus and is very contagious.



CHILLING results from too sudden or too great a change in temperature from that which is normal for chicks. Floor drafts should be avoided as well as overcrowding.

PNEUMONIA is a general name used where the lungs are affected. Chilling, Pullorum, and Bronchitis, are the most common causes. Normally the lungs are salmon-pink in color. In Pneumonia they may vary from a bright red to dark red in color.

WHAT TO DO

Comfort of the chicks is the first consideration in all cases. Raise the temperature of the brooder house about five degrees. It is safe to have the air three inches off the floor under the hover at a temperature of 95° F. in treating respiratory troubles.

LEEMULSION IN THE MASH

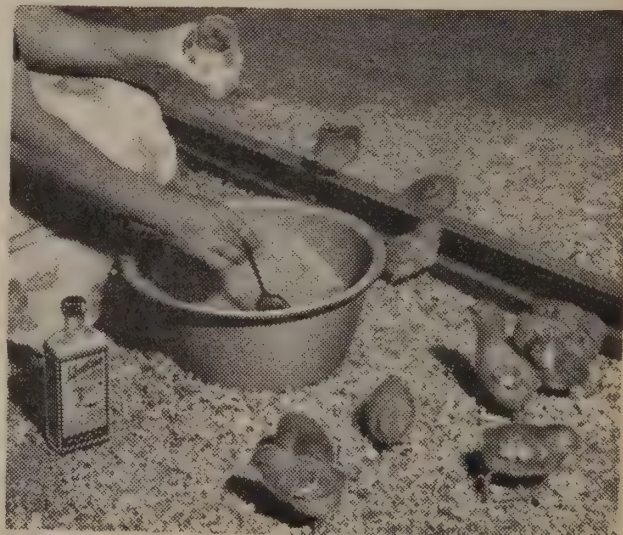
A level tablespoonful of Leemulsion stirred into a quart (or a little less) of water or milk will medicate 5 pounds (a

gallon by measure) of mash. Use the amount of liquid required to give a moist crumbly mash. Feed this treated mash for three days.

This method provides a semi-moist mash without any irritating dust, and is recommended for all chicks under six weeks of age.

LEEMULSION AS A SPRAY

A spray made with Leemulsion can be used without turning off the brooder stove. Stir a tablespoonful of Leemulsion into a glassful (8 oz.) of water, and pour this into a small hand sprayer. Use this generously in the brooder house twice a day as long as required. It can and should be used at the same time Leemulsion is given in the mash.





Lee's PERCH PAINT

for Body Lice and Feather Mites

A Nicotine Product Painted on Roosts

Perch Paint has a special base which locks the Nicotine in until the heat of the bird's body unlocks it. This keeps the Nicotine from being wasted when the birds are not on the roosts, and makes it go much further. And because that base is such that the lime in the droppings cannot release the Nicotine, no special scraping or cleaning of the roostpoles is necessary to keep the Nicotine from being wasted when the birds are not there. That special base



of Perch Paint not only holds the Nicotine in when the birds are not roosting, but when their body heat unlocks the Nicotine to kill lice by fumigation, then the base itself also fumigates the lice.

Feather mites are not common parasites, but heavy infestations can occur in the northern states. They stay on the birds day and night and are often detected by the way they soil the feathers of white birds. Use Lee's Perch Paint for them in the same way as for lice.

DIRECTIONS FOR USE

Pour some Perch Paint into a dry can or cup. With a small, dry brush, paint top of perches about twenty minutes before birds go to roost. If roosts have fairly flat upper surface an oil can spout can be used for application, instead of brush.

PERCH PAINT SIZES		Feet of Perches
$\frac{1}{2}$ Pint Can	Paints	100-125
Pint Can	Paints	200-250
Quart Can	Paints	400-500



Go after Mites and Blue Bugs

WITH

Lee's **MITE KILLER**

Easy to Spray . . Safe to Use . . No Black Stain

Lee's Mite Killer is a generally useful insecticide and disinfectant for poultry house use. Every poultry raiser will find Lee's Mite Killer valuable for some purpose during the year.

FOR POULTRY MITES

These are universal poultry parasites and are able to live on many species of wild birds. Hence every poultry house is threatened with mite infestation. Mites offer a serious problem in hot weather,

when they multiply rapidly.

Spray Lee's Mite Killer liberally into all cracks, crevices, and joints of walls, roosting places and nest boxes. A forced spray pump is best for this purpose. Do this about an hour or more before letting the poultry back into the house. Lee's Mite Killer is very penetrating. It works into the hiding places of mites and kills them by contact. Simple directions for dilution and use will be found on every package. Almost any oil can be used to mix with Lee's Mite Killer, but at least part of it should be heavy to secure lasting action.

FOR BLUE BUGS AND BEDBUGS

Blue Bugs are really vicious ticks (page 39) found in hot, dry climates throughout the world. In the United States they are limited to a belt running from about the southern half of California to Oklahoma and Texas. Bedbugs are common poultry



pests in many localities throughout this country. For both Blue Bugs and Bedbugs, Lee's Mite Killer should be used as described above for Poultry Mites, but the entire house including walls and ceiling should be sprayed. It is also necessary to spray the outside of the house up to about three feet off the ground.

AS A DISINFECTANT

Lee's Mite Killer, even when diluted with oil is an efficient contact germicide. To understand this property, a little consideration of the phenols will help. The first phenol discovered (and used to marvelous advantage by Lord Lister) was carbolic acid. Then the very important cresols were found in coal tar. Later more complicated phenols were made in the laboratory and produced on a commercial scale. These last compounds all have the disadvantage of being insoluble in water. Some of them are quite irritating to the skin. For these reasons we use the water soluble cresols in Lee's Mite Killer. The cresols are the most powerful phenols that can pass readily from the oil mixture to the wet outer covering of germs.

The oil base of Lee's Mite Killer avoids additional dampness, an important consideration to the poultryman. And of course it adds enormously to the mite killing action.

BROODER HOUSE SANITATION

The first step is a thorough cleaning of the house with hoe, spade, and broom. Use lye water or soapy water to remove stubborn dirt if necessary. When the house is fairly dry, brush or spray the inside thoroughly with Lee's Mite Killer diluted according to directions on the label. Chicks can be put in the house three days after treatment. The same method can be used for cleaning houses for older birds.

LITTER "SPRAY"

Many poultry raisers find litter treatment useful in caring for growing stock. Lee's Mite Killer will exert its contact germicidal action in the litter, but complete coverage is not possible as in disinfecting houses. Very often the dust reducing properties of oil treatment are needed.

Treated litter repels insects and discourages picking at droppings.

Lee's Mite Killer should be diluted with a heavy oil for best results. The easiest way is to sprinkle the mixture on new litter a couple of days before using it. Old litter can be heaped up and sprinkled. Do not use more than the litter can absorb easily, and do not put young chicks or poults on freshly treated litter. A little common sense in litter treatment will give additional protection without harm to the birds.

PURPOSE OF SANITATION

The question of the degree of sanitation necessary will arise in the mind of every poultry raiser. A human baby is guarded very carefully for the first six or eight months. After that he begins to crawl about on the floor. Naturally he comes in contact with the millions of germs carried about on the shoes of those who use the same room. His greatest danger from now on is germs from other children that have disease or carry disease. The same reasoning can be followed with chicks. The brooder house should be as sanitary as possible before chicks are put in it. After three or four weeks they have built some resistance and can thrive in a normal environment. The greatest danger is from disease or parasites they might get from older birds. Common sense will dictate the measures necessary to protect the flock.





BLITSPRAY

for Controlling
External Parasites

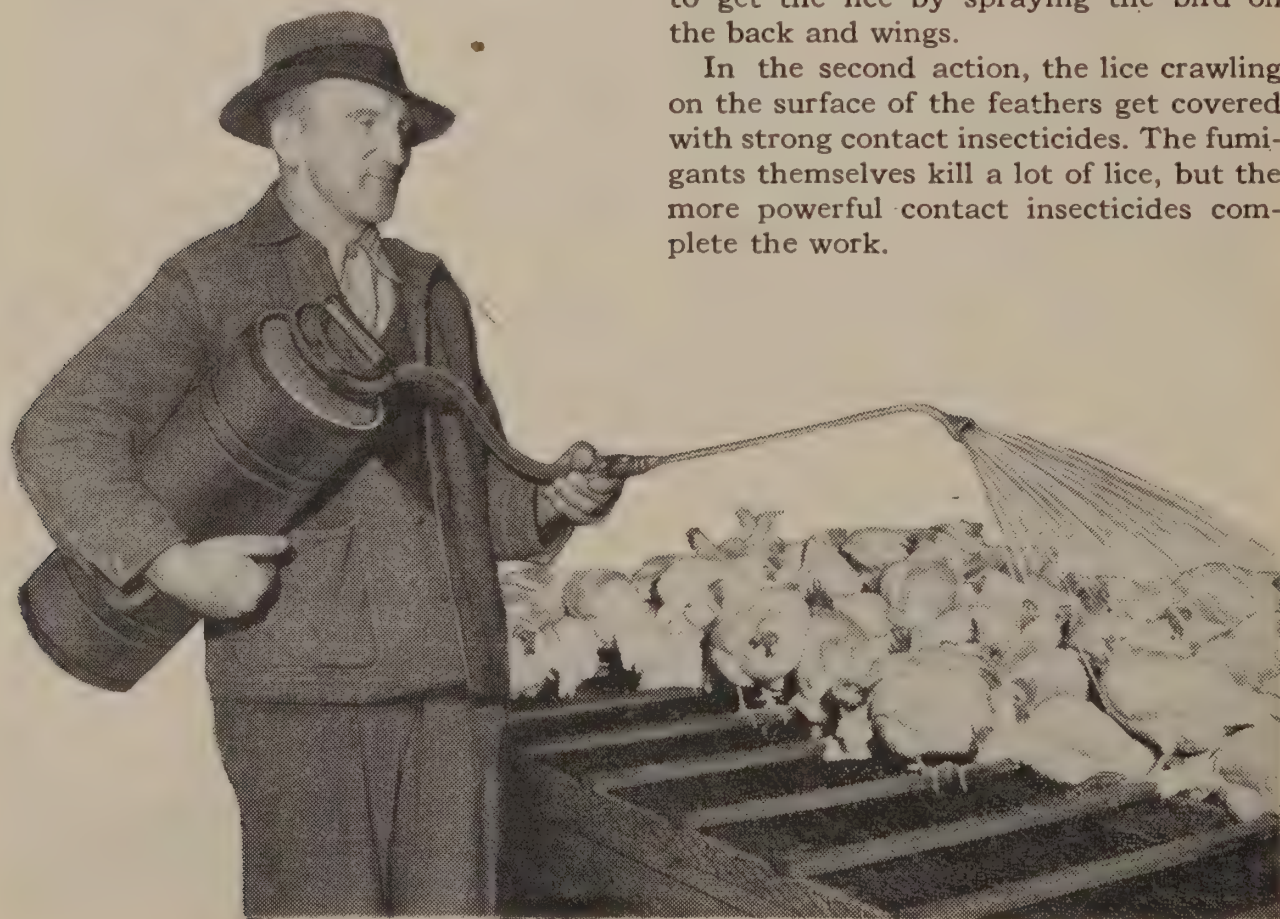
HOW BLITSPRAY WORKS

You will find it helpful to know how Blitspray works in order to see why a small amount on each bird gets the job done.

In the first action the fumigants in

Blitspray drive the lice out to the surface of the feathers of the bird (see picture page 37). For some unknown reason, the lice move upward instead of downward on the bird. This odd fact makes it possible to get the lice by spraying the bird on the back and wings.

In the second action, the lice crawling on the surface of the feathers get covered with strong contact insecticides. The fumigants themselves kill a lot of lice, but the more powerful contact insecticides complete the work.



The New Convenient Direct Spray to Control Lice and External Parasites

For Poultry Lice.—Spray directly on birds over four months of age after they have gone to roost. Always use a fairly coarse spray to get liquid droplets on the feathers of back and wings. Use a leather washer in a pressure sprayer, and clean it out after use (to avoid prolonged contact of Blitspray with rubber parts). Most large hand sprayers holding a quart will give a satisfactory spray if the plunger is worked rather slowly. A fine mist is never desirable. One ounce of Blitspray will treat 15 birds. As with most insecticides, some care and practice will help in using Blitspray to best advantage.

For Fleas on Dogs.—Blitspray is highly recommended for fleas on dogs. Spray the animal and bedding lightly in the morning with a hand sprayer. For small or nervous dogs it is best to apply Blitspray by moistening a small cloth with it and rubbing this over infested areas. Do not use Blitspray on cats.

The action of Blitspray on fleas is rapid. A dog that is constantly scratching and rubbing against things may have other trouble besides fleas. Dog lice, for example, can be controlled by a few treatments with Blitspray, about a week apart.

For Lice on Stock.—Spray infested areas lightly in the morning with a hand sprayer. Repeat treatment in one week. Blitspray will control biting lice on stock, but is not recommended as a complete control for sucking lice on animals with heavy hair. Since hogs have thin hair, Blitspray is a convenient and efficient contact insecticide for the hog louse. Full directions and cautions will be found on the Blitspray label. With any new insecticide, a good understanding of how to use it is necessary for best results.



HINTS ON CHOOSING THE INSECTICIDE YOU NEED

LEE'S LOUSE POWDER (page 76) — for flocks under 50 birds. Two thorough applications a year will nearly always be enough.

LEE'S PERCH PAINT (page 71)—for good housing where perches are easy to paint and just about enough to accommodate the flock.

BLITSPRAY—action not affected by excessive ventilation, and can be used under any housing conditions. Especially valuable if painting the roosts is difficult and frequent use of an insecticide is necessary.

LEE'S MITE KILLER—see page 72. A killing agent for mites and bluebugs, and also of some help in lice control. Lee's Mite Killer has strong contact germicidal action.

ONE
OUNCE
WILL TREAT
15 BIRDS





Lee's Louse Powder is based on DDT and Micro-mesh Sulphur. DDT gives very rapid action; finely ground Sulphur has a long lasting killing power. Sulphur also kills and repels many kinds of mites on poultry and animals.

Convenient—Economical—Sure

LEE'S LOUSE POWDER is a boon to the poultry and stock raiser operating on a small scale. Thorough individual application is so effective that it is the only insecticide needed for lice when this method is practical. Use it on all livestock.



Even for large flocks, a can of Lee's Louse Powder should be kept handy. Very often birds out of condition will be very lousy while the healthy birds in the flock are clean. Such birds may be greatly benefited by a dusting.

PICKPASTE for Cannibalism



Pickpaste is a blood-colored preparation which is repulsive to fowls. A few tastes of it usually teach birds not to pick at one another, unless the habit has become firmly established. It is antiseptic and protects the wounds from dirt.

At the first indication of picking, act promptly. Apply Pickpaste to any slight wounds. Then put a few daubs of Pickpaste on the wings and backs of 15 or 20 of each hundred birds not yet injured. If any birds are badly picked, they should be removed.

Pickpaste is most helpful for chicks up to two months of age. For early Cannibalism in the brood, see page 11. The very serious adult Cannibalism in pullets starting to lay is described on page 34. Pickpaste has some value for this condition, but drastic management change is often necessary.



PIGS SHOULD BE WORMED EARLY. Never wait until your pigs show signs of worms. By that time so much damage has often been done to the intestines, liver and lungs that the animals will not pay for the feed to get them on the market. Clean the worms out before they get a good start. Ten weeks of age is a good time to worm.

USE LEE'S HOG OIL WORMER. Lee's Hog Oil Wormer is made of time-tried and tested medicines which have been proved to be the most effective for removing Large Round Worms. It is easy to give, and is economical and safe.

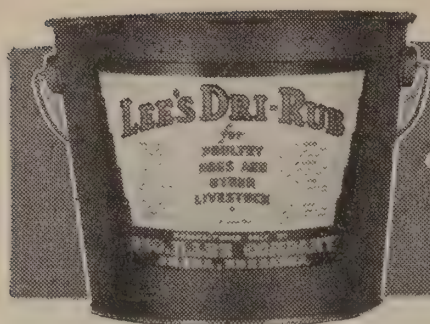
INDIVIDUAL TREATMENT.—This is the most effective method because it insures correct dosage for each animal. Keep pigs or shoats off feed for 10 hours before dosing. Then have the person who will hold the pig, catch it, setting the pig in an upright position, holding it by the front legs, and with its back against the helper's knees. Draw up a dose of Lee's Hog Oil Wormer into the syringe. Then place the thumb of one hand on the pig's throat; with the other hand insert the nozzle of the syringe in the side of the pig's mouth, so that the nozzle is well back on the tongue. Push down on the plunger slowly. As long as your thumb feels the pig swallowing,

keep on pushing the plunger. If the pig stops swallowing, you stop. You can start it swallowing again by moving your thumb up and down on its throat. After the medicine is given let the pig down. That is all there is to it.

HERD TREATMENT.—This may be a necessity in busy times. Take the pigs off feed in the afternoon, and see that they get no feed until the next morning. Estimate the amount of Lee's Hog Oil Wormer required (see Dosage below) for the herd. Mix this in the morning with bran or other chopped feed to give a crumbly mix. This can then be stirred into thick slop or dry feed—as much as the animals will clean up in half an hour. Do not give any other feed or water for four hours. At the end of the four hours a laxative can be given—one ounce of Glauber's Salt or $\frac{1}{2}$ ounce of Epsom Salt for each pig weighing 40 lbs.

DOSAGE. Three-fourths of an ounce for pigs weighing 40 pounds; less for smaller pigs. One ounce for pigs weighing 70–75 pounds, $1\frac{1}{4}$ ounces to heavier hogs. Runts should get the same dosage as other pigs of same litter.

	No. of Doses (40 lb. pigs)	No. of Doses (70 lb. pigs)
1 quart	42	30
$\frac{1}{2}$ gallon	85	60
1 gallon	170	120



Lee's **DRI-RUB**

For Poultry, Hogs and
other Livestock

Lee's Dri-Rub is a strong insect repellent, and for many external parasites an insect killer. It helps give a fresh air of cleanliness often hard to obtain in poultry and livestock quarters. Because it is so inexpensive, it can be used freely in nest, dust boxes, and litter for poultry. And it has similar uses for other stock. It is based on naphthalene, creosote oil, and a very finely divided sulphur. The micronized sulphur in it has particles twenty-five times smaller than ordinary sulphur flour. This makes Lee's Dri-Rub considerably more effective.

FOR HOGS. Dri-Rub is important in controlling hog lice. The hog louse is one of the largest and most loathsome of all lice. Dri-Rub should be sprinkled on the animal and rubbed in, especially around the ears. Sprinkle it in the bedding too.

RABBIT HUTCHES. After cleaning rabbit hutches, you can deodorize them easily by sprinkling Dri-Rub about, in corners, cracks and nests.

FOR SEEDS. Dri-Rub has been found useful for protecting seeds from insects. In corn planting, a generous handful is placed on top of the seed after filling the planter box.

SOIL PESTS. Grubs, beetles, and the like can often be discouraged by using 2 pounds of Dri-Rub to each 100 square feet of soil (plot 10 feet by 10 feet). Sprinkle on evenly before spading.

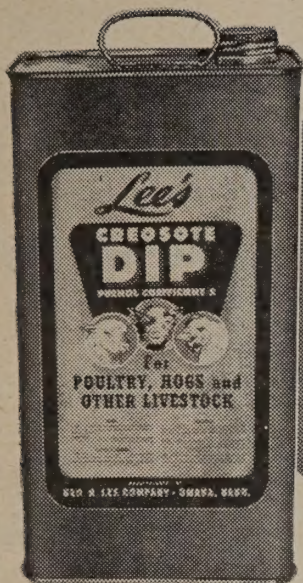
FOR FLEAS. Dri-Rub is extremely useful in caring for large dogs in kennels.

It can be used on animals and in the bedding.

In some parts of the country, as in the South, other fleas besides the common dog flea may become pests. It is necessary to get at the breeding place, often dusty soil under a building, to conquer these parasites. Sprinkle on about one pound of Dri-Rub for about 25 square feet of area (a space 5 feet square), and rake in a little for best results. Dri-Rub can also be used on the floor of the building itself.

Sizes: 3-lb. can; 12-lb. carton; 25-lb. pail; 50-lb. drum; 100-lb. drum; 300-lb. barrel.





Lee's
**CREOSOTE
 DIP**
Phenol Coefficient 5

A Standard General Purpose Disinfectant for the Farm

A good dip and disinfectant is one of the most valuable helps the farmer or poultryman can have in keeping down disease. It must be a good disinfectant — not just one with a pleasant odor, but one that will actually **KILL GERMS**.

Lee's Creosote Dip has efficient germ

killing properties when one ounce is added to one hundred ounces of water ($1\frac{1}{4}$ ounces to a gallon of water). It may save spraying time and reduce dampness to use it stronger, up to 8 oz. per gallon. You get as much killing power from each ounce.

When dampness must be avoided or insecticide action is also necessary use Lee's Mite Killer (page 72), diluting with oil according to directions.



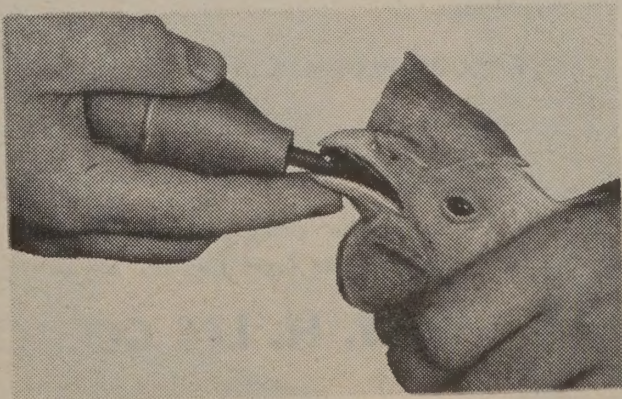
Lee's
**POULTRY
 NASAL
 SYRINGE**

Lee's Poultry Nasal Syringe is again available to aid in cleaning out the head passages of chickens and turkeys suffering from Colds, Roup, or Sinusitis.

The Lee Nasal Syringe filled with *antiseptic solution* is inserted in the mouth of the fowl so that the mouthpiece will fit comfortably on the beak with the raised center inserted in the cleft in the roof of the mouth. Gentle pressure on the bulb will then force the antiseptic solution into the cleft and out through the tear ducts and sinuses. The exudate and collected

mucus can thus be washed out gently and thoroughly.

ANTISEPTIC SOLUTION — This can be made with either Germozone or Leemulsion. If Germozone is used, put three (3) tablespoonfuls in a quart of lukewarm water. If Leemulsion is used, stir one (1) tablespoonful in a quart of lukewarm water. Either medicine will provide a safe non-irritating antiseptic wash.



Retail Price List of Lee Products

We will make every effort to avoid raising prices, but due to present, uncertain conditions all prices below are subject to change without notice.

GERMOZONE (Pages 53-58)

4 oz. bottle.....	\$.40
12 oz. bottle.....	.75
1 quart bottle.....	1.50
*1/2 gallon jug.....	2.50
*1 gallon jug.....	4.50

GIZZARD CAPSULES (Pages 60-61)

Adult Size	{	Can of 50.....	\$.75
		Can of 100.....	1.25
		5 Cans of 100.....	5.50
		1 Envelope of 10.....	.15
Pullet Size	{	Can of 50.....	.50
		Can of 100.....	1.00
		5 Cans of 100.....	4.50
		1 Envelope of 10.....	.10
Chick Size	{	Can of 50.....	.40
		Can of 100.....	.75
		5 Cans of 100.....	3.25
		1 Envelope of 10.....	.10

ACIDOX (Pages 66-67)

4 oz. bottle.....	\$.50
12 oz. bottle.....	1.00
1 quart bottle.....	2.00
*1/2 gallon jug.....	3.50
*1 gallon jug.....	6.50

LEEMULSION (Pages 68-70)

4 oz. bottle.....	\$.50
12 oz. bottle.....	1.00
1 quart bottle.....	2.00
*1/2 gallon jug.....	3.50
*1 gallon jug.....	6.50

VAPO-SPRAY (Page 69)

1 pint.....	\$.50
1 quart.....	.75
*1/2 gallon.....	1.25
*1 gallon.....	2.00
*5 gallon.....	8.75

BLITSPRAY (Pages 74-75)

1 pint bottle.....	\$.75
1 quart bottle.....	1.25
*1/2 gallon jug.....	2.25
*1 gallon jug.....	4.00

LEE'S FLOCK WORMER (Pages 62-63)

8 oz. can.....	\$1.25
1 lb. can.....	2.25

LEE'S LOUSE POWDER (Page 76)

1 lb. can.....	\$.30
2 1/2 lb. can.....	.60

TONAX (Pages 64-65)

12 oz. can.....	\$.30
2 lb. can.....	.75
6 lb. can.....	2.00
25 lb. pail.....	7.50
*50 lb. drum.....	14.00
*100 lb. drum.....	25.00

LEE'S MITE KILLER (Pages 72-73)

1 quart.....	\$.60
1/2 gallon.....	.90
*1 gallon.....	1.50
*5 gallon.....	6.00

PERCH PAINT (Page 71)

1/2 pint can.....	\$.85
1 pint can.....	1.50
1 quart can.....	2.50
*1/2 gallon can.....	4.00
*1 gallon can.....	7.00

PICKPASTE (Page 76)

2 oz. tube.....	\$.25
6 oz. jar.....	.60

LEE'S DRI-RUB (Page 78)

3 lb. can.....	\$.45
12 lb. pail.....	1.50
25 lb. pail.....	2.25
*50 lb. drum.....	4.15
*100 lb. drum.....	7.50

HOG OIL WORMER (Page 77)

12 oz. bottle.....	\$1.00
1 quart bottle.....	2.00
*1/2 gallon jug.....	3.50
*1 gallon jug.....	6.75

LEE'S CREOSOTE DIP (Page 79)

1 quart bottle.....	\$.75
*1 gallon jug.....	2.00
*5 gallon can.....	8.75

LEE'S POULTRY NASAL SYRINGE (Page 79)

Each.....	\$.75
-----------	--------

*Cannot be mailed, but can be sent by express or freight.

All Lee Dealers ask only our established prices. If there is no Lee Dealer at your

point, you may order direct from us, cash with order. We prepay all retail shipments.

GEO. H. LEE CO., Omaha 8, Nebraska

(Printed in U. S. A.)

PRINTED BY R. R. DONNELLEY & SONS CO., CHICAGO



CONTENTS
1 QUART

MITE KILLER
FORMERLY LEE'S
LICE KILLER

LEE'S

For POULTRY MITES, BLUGGERS,
BEDBUGS, TERMITES as directed

Lee's

DRI-RUB

For
**POULTRY, HOGS and
OTHER LIVESTOCK**

NET WEIGHT 3 POUNDS - 4.54

As aid in general sanitation in poultry houses, etc.
with other methods and dry barns. Sprinkle in the
corners of all houses and outdoor pens.

Contains 25% Turpentine Oil, 75% kerosene.

Manufactured by
COMPANY - OMAHA, NEB.

CONTENTS
ONE HALF GALLON

LEE'S

**PERCH
PAINT**

NICOTINE DELOUSER

**LOUSE
POWDER**

LEE'S

FOR POULTRY
AND LIVESTOCK

Manufactured by Lee's Chemical Company, Omaha, Nebraska

Contents
ONE PINT

BLITZSPRAY
FOR CONTROL
OF EXTERNAL
PARASITES

LEE'S

For LICE on POULTRY and SWINE,
FLIES and BED BUGS as directed

12 OZ. NET WEIGHT

**LEE'S
TONAX**

A TONIC
AND
CONDITIONER

FOR CHICKENS AND TURKEYS

Ingredients: Maltose, Lactose, Dextrose, etc.

Manufactured only by
**GEO. H. LEE CO.
OMAHA, NEBRASKA**

Emulsion

AN EMULSION
OF PURE
FISH LIVER OIL
AND VITAMIN
D

FOR POULTRY AND LIVESTOCK

**GEO. H. LEE CO.
OMAHA, NEBRASKA**

ACIDOX

15 OZ.

For the dressing of wool in preparation for
dyeing and other uses with acid dyes.

Manufactured by Lee's Chemical Company, Omaha, Nebraska

**GEO. H. LEE CO.
OMAHA, NEB.**

1 PINT

**LEE'S
VAPO-SPRAY**

A VALUABLE AID IN THE TREATMENT
OF COLDS AND MINOR BRONCHIAL
IRRITATIONS IN POULTRY AND HOGS

Ingredients: Pine Tar Oil, Tar Acid Oil,
Hydrocarbon Oil, Oil of Eucalyptus, Sulphur.

MANUFACTURED ONLY BY
**GEO. H. LEE CO.
OMAHA, NEB.**

**LEE'S
GIZZARD
CAPSULE**

LARGE (ADULT) SIZE

Active Ingredients: About 10%
Bile Salts, 90% Vegetable Oil.

FOR
CHICKENS and TURKEYS

100 CAPSULES
Average weight: 33 grains each

**Geo. H. Lee Co.
OMAHA, NEB.**

**LEE'S
GERMOZONE**

15 OZ.

FOR
POULTRY

Manufactured by Lee's Chemical Company, Omaha, Nebraska

**GEO. H. LEE CO.
OMAHA, NEBRASKA**

**LEE'S
RICK PASTE**

FOR POULTRY

Breaks the
itchiest hives

**GEO. H. LEE CO.
OMAHA, NEB.**

The Line of Quality

Compliments of

GEO. H. LEE COMPANY, Omaha 8, Nebraska